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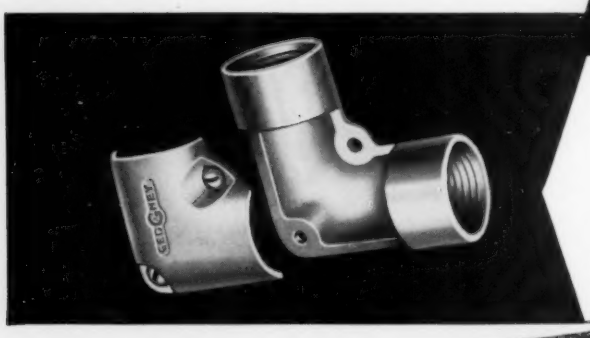

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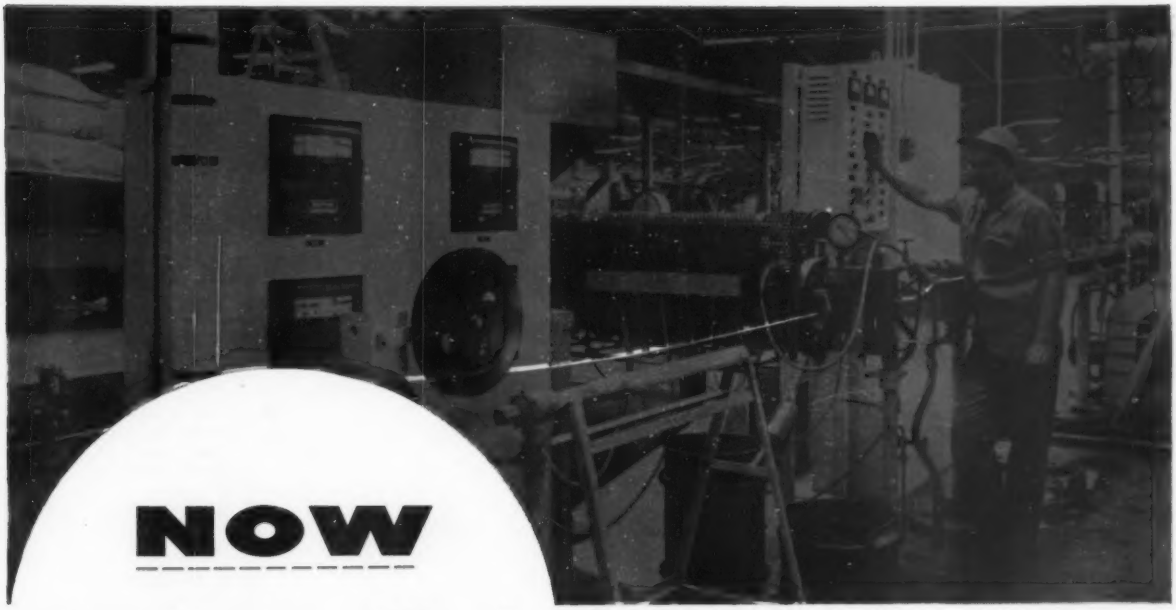

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Economic comment

by J. Whitney Bunting, Ph.D.

Contributing Economics Editor

Inflation—yes or no

One of the major economic quandaries as the last half of 1957 passes is the outlook in regard to inflation. Certainly it is difficult to assess all economic factors and arrive at a complete and practical conclusion that will foretell the trend of prices. Nevertheless, there are certain indicators that can be expected to exert heavy pressure upon price levels in the final months of the year.

The last report of the Bureau of Labor Statistics places employment in the United States at an all time high, in excess of sixty-seven million persons. The continued upsurge of the working population has contributed a growing consumption of most products, except autos and houses recently, and the competitive bidding of buyers armed with ample purchasing power has strengthened prices.

The latest index of prices has risen to new and unprecedented heights, and as has been reported before, any combination of strong buying power with consumer optimism will usually contribute to an increasing price level.

In addition to this feature of the present economic picture, there are other positive pressures that should tend to force the price spiral upwards. The impact of future wage demands by labor unions that will still arise in the autumn months will undoubtedly be reflected by manufacturers in the retail price listings. How strong labor's demands for higher wages will be is difficult to conjecture, but much will depend upon the strength of the economy as wage talks progress.

Some influence may be felt from the reduction of government contracts in the latest Washington economy move. Food prices cannot help being influenced by the continued drought in the northeastern section of the country. Not only will food prices be high because of the reduction of supplies in this one area, but national competion for residual supplies in other areas will certainly increase costs in the south and mid-west.

Anti-inflationary factors

On the other hand, there are certain anti-inflationary factors that seem now to be gathering added strength. A definite feeling exists that the nation is on a plateau and will probably stay on the same economic level throughout the balance of the year. Part of this reasoning stems from the interest of the Administration in Washington in the maintenance of a good optimistic economic scene. Without such a condition there is real fear that the 1958 elections would hold no pleasure for the Republican party.

Therefore it is quite possible that the nation may expect a limited amount of governmental activity designed to prevent a runaway inflation, but not enough control to force a down-swing in economic activity. The current level of prices worries many government economists, and they fear the result of further price increases at this time.

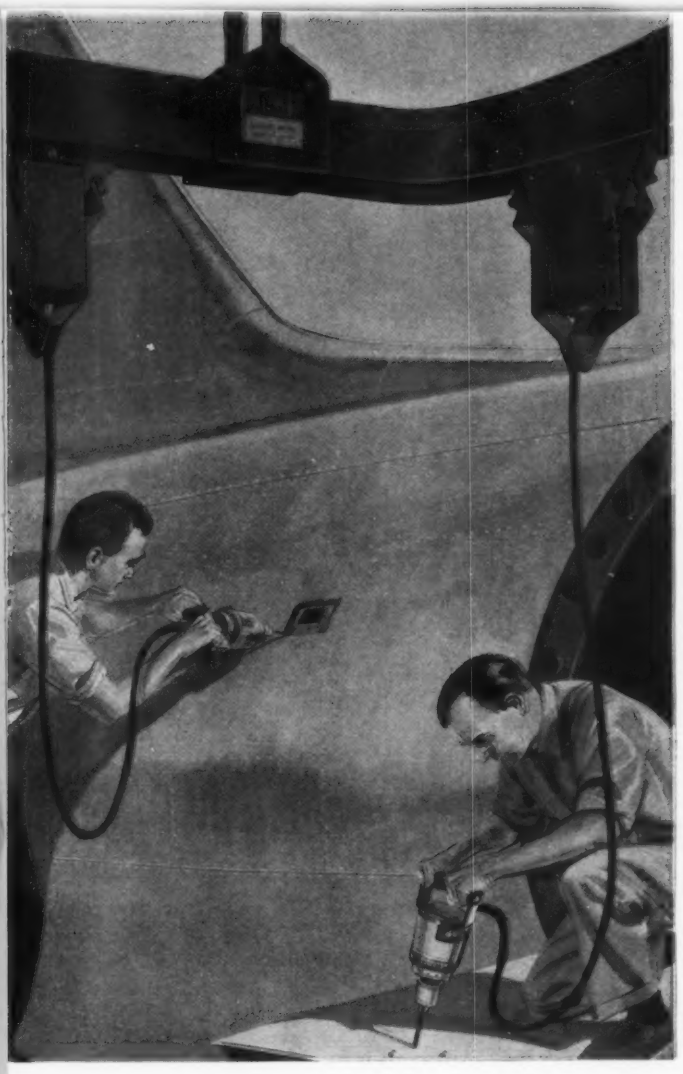
FRB applies brake

At the same time, Federal Reserve Board action in raising discount rates is another block to runaway inflation. Action was taken in selected reserve cities to limit borrowing and unwise credit expansion. Since the latter two activities promote inflationary conditions, the action of the Federal Reserve serves as an efficient brake upon inflationary tendencies. Continued appraisal of the money market can be expected by the banks themselves, particularly in view of the higher costs of obtaining money.

A final factor in the muddled inflation picture is the influence of corporate plant expansions upon business conditions. Acting upon the assumption that business activity has levelled off on a plateau and armed with the fact that money for all purposes is becoming increasingly difficult and costly to get, many corporate expansion programs have been delayed or postponed until the picture of the future becomes more clear.

The best guess now is that business activity will become more brisk in 1958 after a period of readjustment at the present plateau level. If this is true and business sees it can move forward confidently with the presently deferred expansion plans, then the boom in 1958 can be expected to materialize.

Dr. Bunting is a well-known economist and educator having special knowledge of the South.



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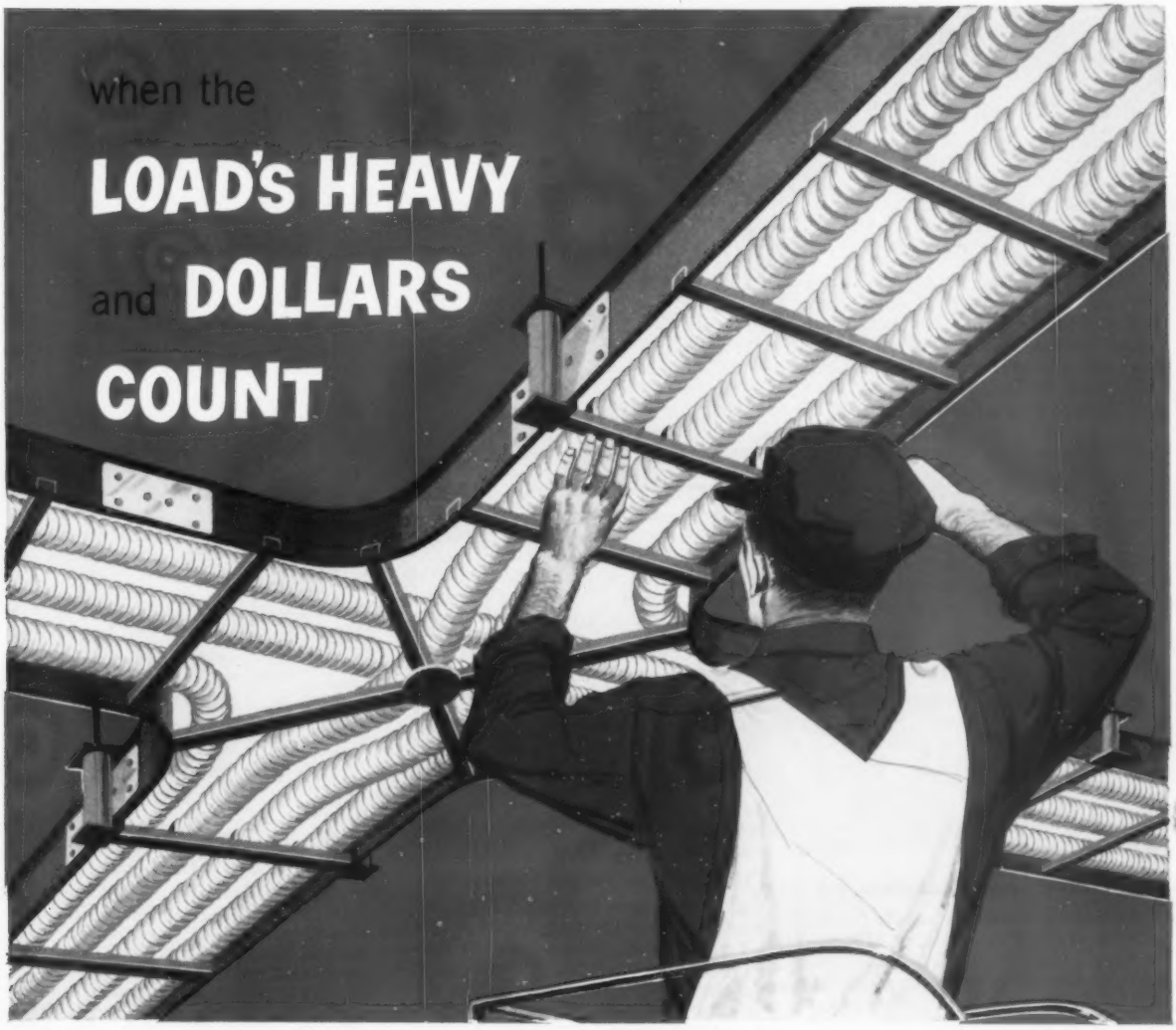

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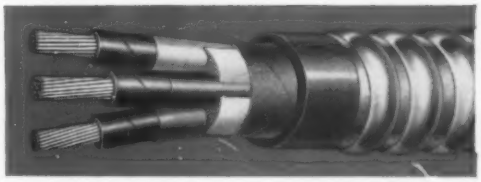

Whether you're working on the modernization of old facilities or new plant construction, you'll find it profitable to get the details on National Electric Nepco-Lok Interlocked Armored Cable.

Call your National Electric representative or write National Electric Products Corporation, 2 Gateway Center, Pittsburgh 22, Pa.

National Electric Products

PITTSBURGH, PA.
2 Plants • 12 Warehouses • 41 Sales Offices

NE SPECIAL CABLES WILL MEET YOUR REQUIREMENTS FOR POWER, CONTROL AND ELECTRICAL EQUIPMENT

CATALOGS and BULLETINS

Available Free to Readers of Electrical South upon Request

1011—Electrical Conduits

"Natural Electric Conduits" is the title of the 30-page Catalog No. 603 which describes and illustrates the many types of electrical conduits that are manufactured by National Electric Products Corp., 2 Gateway Center, Pittsburgh 22, Pa.

1015—Squeezon Connectors

The Squeezon, a new compression connector for power lines, is fully described in bulletin "SQ" available from the James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo. The Squeezon features greatly increased electrical and mechanical efficiency.

1019—Service Panels

Information on protective electrical control centers for homes, apartment buildings, service stations, and industrial applications is contained in Bulletin PM-355, "BullDog Pushmatic Electric-Centers," issued by BullDog Electric Products Co., 7610 Jos Campau, Detroit, Mich.

1071—Plugs and Receptacles

Additional loose-leaf sheets for insertion in the Pylet Catalog 1100 are available from the Pyle-National Co., 1354 N. Kostner Ave., Chicago 51, Ill. These pages describe a wide range of plugs and receptacles for special purposes.

1085—Lighting Fixtures

Eastern presents their most complete catalog, 32 pages of engineered lighting data, including a variety of fixtures for all architectural, commercial and industrial applications. Eastern Fixture Co., Inc., 170 Vernon St., Boston 20, Mass.

1087—Fittings Catalog

The M. & W. Electric Mfg. Co., Inc., East Palestine, Ohio, has available their new 28-page catalog 53, covering Service Entrance Mast Fittings, Service Entrance Cable Fittings, Ground Clamps, Rods, BX and Romex Connectors, Conduit Fittings, Wireholders, Insulators Supports and Cable Racks.

1097—Cord Catalog

A complete 48-page catalog is available from the Cornish Wire Co., 50 Church St., New York 7, N. Y. containing all data on flexible and portable cords, lamp cords, heater cords, cordsets, radio and electronic wires.

1099—Lighting Fixtures

Fluorescent and incandescent luminaires for schools, offices, stores and factories are illustrated in a series of bulletins issued by Curtis Lighting, Inc., 6134 West 65th St., Chicago 38, Ill. The entire series or any individual bulletins may be obtained upon request.

1103—Compression Connectors

Burndy's new Bulletin CR-1A features the new Crimpit technique for all overhead distribution connections. The bulletin provides information on the entire Cripit line, including details of hydraulic installation tooling and accessories. Copy available from Burndy Engineering Co., Inc., Norwalk, Conn.

1107—RW and RHW Wire

"The Ampere Squeezer," a booklet explaining visually the effect of ambient temperatures on current carrying capacities of RW and RHW Wire. Simplex Wire & Cable Co., 79 Sidney St., Cambridge 39, Mass.

1109—Anchoring Devices

An illustrated 32-page catalog, No. 65, describing more than 25 anchoring and drilling devices for making fastenings to masonry, is available from the Arro Expansion Bolt Co., Marion, Ohio.

1135—Wiring Devices

Catalog No. 51, containing complete electrical wiring device line of Leviton Mfg. Co., Brooklyn 22, N. Y. is a 96-page thoroughly illustrated one. Included are such features as the Kwik-Change line, with wiring diagrams, a general index, and an index to catalog numbers.

1155—Wire and Cable

Two catalogs—Bulletin RS-5, and Power and Control Cables, No. 24—available from Rome Cable Corp., Rome, N. Y. Power and Control Cables catalog is intended for utility, construction, and industrial engineering and purchasing personnel as a guide in selection of proper wire and cable types.

1167—Industrial Lighting

A four-page catalog insert is now available from the Multi Electric Mfg. Co., Inc., 4223-43 West Lake St., Chicago 24, Ill. The leaflet describes Multi's line of lighting equipment and wiring devices, which include floodlights, vaporproof fixtures, and fluorescent and incandescent fixtures.

1175—Fish Tape Leader

The new fish tape leader for hand tapes is described in an information sheet offered by The Barth Corp., 12650 Brookpart Rd., Cleveland 30, Ohio. The "Snake Charmer" facilitates pushing tapes in all runs and promotes correct twist at reverse elbows.

ELECTRICAL SOUTH
806 Peachtree St., NE **Sept., 1957**
Atlanta 8, Ga.

Gentlemen:

Please send me the bulletins and catalogs indicated.

(Print Plainly)

Name _____ **Title** _____

Company _____

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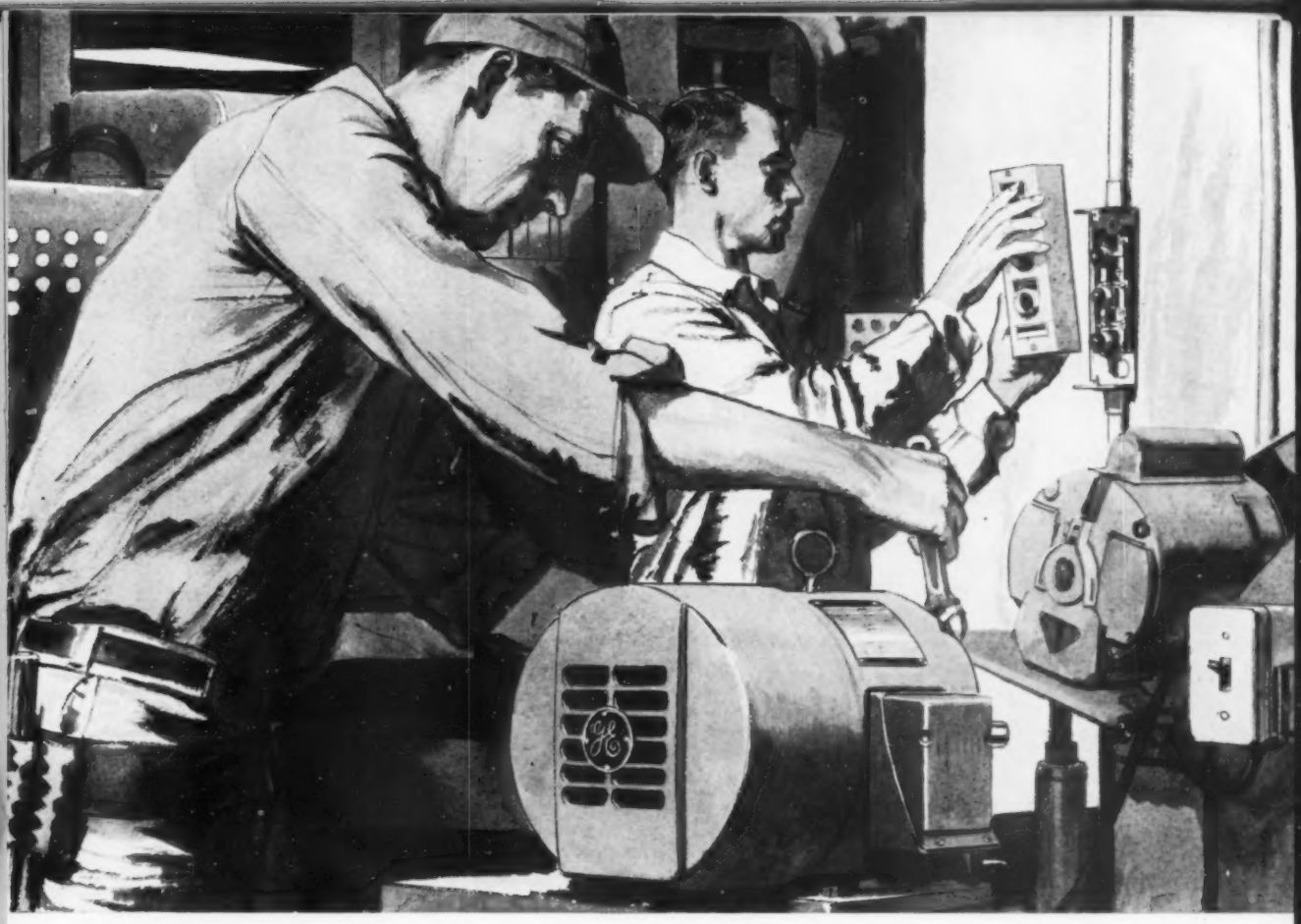
Circle numbers below. Bulletins and catalogs will be mailed promptly.

1011	1015	1019	1071	1085
1087	1097	1099	1103	1107
1109	1135	1155	1167	1175
1195	1197	1209	1211	1219
1223	1227	1229	1231	1233
1237	1239	1241	1245	1251
1253	1255	1257	1259	1261

6 WAYS



Exactly the right G-E motor in type, speed and power for every drive job is ready for you through any Graybar location. Through the same convenient source you, and your customers, can get experienced help in picking the right controls. To insure proper selection, you don't need to know all about all controls. Just know — and use — the phone number of your nearest Graybar office.

How to pick the one best GE MOTOR and CONTROL for any power drive you may have

In a single day you may have several different motor problems. You may need high starting torque for one job, constant speed for another. And often your motors have to work dependably in dusty, dirty air. For each job, and for every other motor drive need, there is one best G-E Tri/Clad motor to do the work with complete satisfaction. And matching control. For precise selection and prompt, friendly help you and your customers can rely on Graybar.

Through more than 130 Graybar offices and warehouses too, you and your customers have, conveniently available, motors, controls and over 100,000 electrical items. Further, Graybar Specialists, strategically located throughout the United States are ready and willing to give you the full benefit of their broad experience in motors, control, wiring, lighting, ventilation, electronics and communication. When you need help or advice, scheduled or emergency shipments, on *anything electrical*, always CALL GRAYBAR FIRST.

741-79

These two bulletins give you valuable help in the selection of motors and controls for specific jobs. Send now for your copies.

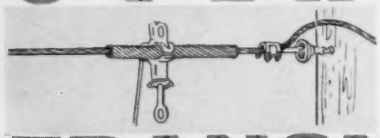
CALL **GraybaR** FIRST FOR

GRAYBAR ELECTRIC COMPANY, INC., 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK, IN OVER 130 PRINCIPAL CITIES

6 WAYS TO PROTECT OVERHEAD TRANSMISSION AND DISTRIBUTION LINES WITH

ARMOR RODS
To protect and strengthen lines at points of maximum stress or where wear or breakage is likely to occur.

LINEGUARDS
Economical conductor protection where short conductor spans and low tensions are used.



TAP ARMOR
Provides maximum line protection on long spans at the points of clamp attachment.

PATCH RODS
For open-span repairs, where conductor damage is minor and is confined to the wires of the outer layer.

PLASTIC FANNGUARDS
Protect wire coverings and prevent tree abrasion to overhead lines.

FANNGRIPS
Made of galvanized steel, aluminum alloy or copperweld. Powerful non-slip grip makes them ideal for conductor dead-ending, guying or for service drops.

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NOW . . . through its Plastic Division, **FANNER** offers a wide variety of **INSULATING TUBINGS** and **MOULDINGS** for electrical purposes.

Enter Code Numbers of Catalogs Desired on Coupon on Page 8

1195—Kitchen Ventilation
Descriptive eight - page folder, Bulletin 620H, showing typical installations of all models in the Clipper line of ventilators is available from Trade-Wind Motorfans, Inc., 7755 Paramount Blvd., Rivera, Calif. Folder includes dimensional drawings of installations helpful to building and electrical contractors.

1197—Convenience Outlets
Four-page bulletin gives complete information on the new P&S No. 500 for adding extra outlets to existing installations. Everything you need in a single package—on steel boxes required. Available from Pass & Seymour, Inc., Dept. ES, Syracuse 9, N. Y.

1209—Fluorescent Ballasts
Advance Transformer Co., 2950 N. Western Ave., Chicago 18, Ill., has recently completed the compilation and printing of a 20-page catalog on fluorescent ballasts and their use. Included are data sheets on available Advance ballasts and a comprehensive installation and operation section and testing procedures. Copies of the booklet are available on request.

1211—Fluorescent Fixtures
Catalog folder No. 911, "Peerlite by Guth," has been announced by the Edwin F. Guth Co., 2615 Washington Blvd., St. Louis 3, Mo. Copies of this new eight-page booklet are available from the company upon request. The booklet is designed for the lighting specialist, giving complete engineering data and dimensions.

1219—Electrical Enclosures
Catalog No. 5354-U is a 66-page catalog describing the complete line of steel and aluminum electrical enclosures manufactured for utility use by the B & C Metal Stamping Co., 590 Means St., N. W., Atlanta, Ga. The catalog is well illustrated and contains complete specifications as well as prices on all items in the B & C line.

1223—Circuit Protection
A 24-page illustrated handbook contains suggestions for selecting the right kind of protection for electric circuits, motors, appliances and apparatus. Includes motor wiring diagrams and a complete list showing proper size fuses to use. Available from Bussman Mfg. Co., University at Jefferson, St. Louis 7, Mo.

1227—Conduit Fittings
A new complete 4-page catalog illustrating their complete line of conduit fittings and lighting parts for the electrical wholesaler has been made available by Elliott Electric Products Co., 1513 Olmstead Ave., New York 62, N. Y.

Enter Code Numbers of Catalogs

NEW HANDLING EASE

with NEW ROYAL ELECTRIC "HANDI-PAKS"

The popular sizes of ROYAL ELECTRIC Types S and SJ cords that you regularly stock and sell are now packed in NO-ROLL, NO-TIP "HANDI-PAK" corrugated cartons. Each 250-foot spool, in its own container, is easier to handle when you receive it, stacks better and stays cleaner on your shelves, handles easier when you put it on display. Big, clear labels on easy-opening tuck ends tell contents at a glance.

For the finest cord in the handiest container, insist on ROYAL in the new "Handi-Pak" cartons next time you order from your wholesaler.

ROYAL ELECTRIC CORPORATION
Pawtucket • Rhode Island

ROYAL ELECTRIC
AN ASSOCIATE OF ITT

an associate of International Telephone and Telegraph Corporation

IF PLANT VENTILATION IS YOUR 'BABY'

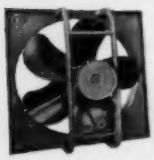
. . . Problems of fume, steam and smoke removal land in your lap. Some areas are too hot for peak work efficiency—fresh air has to be moved into every part of the plant—perhaps humidity control is important or paint booths have to be ventilated . . . You may have any number of different problems, but . . .

Power Line

CAN PROVIDE EVERYTHING . . . FROM SURVEY TO COMPLETE INSTALLATION!

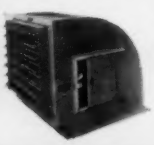
For over 30 years we have been fan specialists. We can effectively assist in the design of a complete plant ventilating system or a spot cooling device. Furthermore, we are not limited in our recommendations because we have over 1000 models and sizes in our line to choose from . . . virtually every type of fan and ventilator that you could possibly use.

Use Power Line's Engineering Experience



TYPE BV

TYPE DRP & BRP



Power Line engineers can provide practical solutions to any ventilating problem . . . We'll gladly make a survey and make our recommendations without cost or obligation—just call or write us!

TYPE DRE & BRE

Power Line FAN COMPANY
PLAINFIELD, NEW JERSEY

Enter Code Numbers of Catalogs Desired on Coupon on Page 8

1229—Switch and Outlet Boxes
A new RACO General Catalog is now available listing detailed information on boxes, covers, and bar hangers. The catalog includes data on numbers of wires permitted per box and a list of comparative catalog numbers. Copy available from All-Steel Equipment, Inc., Aurora, Ill.

1231—Conduit
A handy, pocket-size booklet illustrating and describing four ways to greater conduit efficiency and lower installation costs has been published by Youngstown Sheet and Tube Co., Youngstown, Ohio.

1233—Troffer Catalog
A 36-page catalog, with complete information on their newly re-designed architectural troffers has been released by Smithcraft Lighting Division, Chelsea, Mass. Divided into sections for selection of lighting units, the catalog gives complete illustrations and data for 1 and 2 foot troffers in all types of ceiling construction. Also included in the catalog is information on ceiling lighting patterns, shielding designs, lighting techniques and applications.

1237—Wireholders
Knox Porcelain Corporation, Knoxville 1, Tenn. has recently redesigned a one-piece metal base style reinforced wireholder, No. 5009. Base and screw are hot dipped galvanized. This wireholder has extra sharp threads and quick starting point to make driving easy. KNOX manufactures a complete line of Porcelain Wireholders, House Brackets, and other Secondary Service Materials.

1239—Heavy and Light Duty Power Derricks
J. H. Holan Corp., 4100 W. 150th St., Cleveland 11, Ohio has available a 4-page catalog on the Series 4700 Power Derrick—a light-duty derrick that lifts loads to 6500 pounds, poles to 55 ft. They also have available a catalog on 3700 Power Derrick containing data on derricks for lifting poles up to 75 feet long and loads up to 12,000 pounds.

1241—Fans
A convenient file folder covering attic and industrial ventilating fans, up to 108" diameter, is available upon request from American Coolair Corporation, Box 2300, Jacksonville 3, Florida. The attractively illustrated catalog pages are bound into the folder, which is available with or without list price sheets.

1245—Exhaust Fans
Two new two-color illustrated four-page catalogs (Bulletin Nos. 6414 & 6514) describing the new Model G Ventura fans for business and commercial exhaust applications and Model K for industrial heavy-duty exhaust applications are now available from American Blower Corp., Detroit 32, Mich.

WHY WORRY about aluminum or bi-metallic connectors?

DO THIS ▼▼▼

1. Wire brush conductors with a...

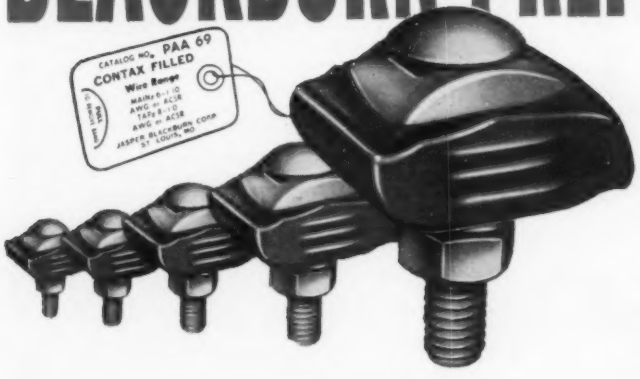
BLACKBURN WIRE BRUSH

with exclusive GLOVE GUARD

- Exclusive guard prevents glove puncture
- Easy grip handle and guard completely covered with durable thermo-plastic coating
- Brush elements can be rotated and are replaceable
- Number WBH-2 furnished with hot line tool adaptor
- Competitively priced

2. Use...

BLACKBURN PREFILLED CLAMPS



PAA, PAC and PGP LINES

Contax liberally applied to each groove at factory, then sealed in. Catalog number and wire range printed on tag. Just wire brush conductor—pull tear string—cover drops off—clamp ready to install. Blackburn Prefilled Clamps save installation time—give you positive assurance compound is <u>always</u> applied to connections.

Available through electrical wholesalers everywhere

JASPER BLACKBURN CORPORATION

1525 WOODSON RD., ST. LOUIS 14, MO., WYdown 3-9430

Revere hinged pole with 3 floodlights and 5 par lampholders in use in Chicago area "drive-in."
Low cost lighting maintenance with Revere hinged poles
REVERE

Hinged poles, engineered to hold from 1 to 4 floodlights, are available in round, square and square-tapered models in heights from 18 to 30 feet.

Reduce the cost of relamping, cleaning and maintenance by using Revere hinged poles in your outdoor lighting installations. No matter who provides lighting maintenance, it's performed more quickly, safely at ground level. The cost of using boom trucks is eliminated. Hazardous and time-consuming use of long ladders is avoided. First cost of Revere hinged poles is no more than ordinary light poles.

From a quality standpoint, Revere hinged poles are built for rugged duty and will withstand wind loading of 100 m.p.h. Check with your electrical supplier on other cost and quality advantages of Revere hinged poles.

Write for complete Revere catalog

Revere ELECTRIC MFG. CO.

Revere Electric Mfg. Co., 6009 Broadway
Chicago 40, Ill., UPtown 8-7100

Available in Canada thru Curtis Lighting, Ltd., Leaside, Toronto, Ontario

Outdoor Lighting: Industrial • Commercial • Service Stations • Streets • Sports • Airports • Shopping Centers

Enter Code Numbers of Catalogs Desired on Coupon on Page 8

1251—Radiant Heating Cables

Three folders, describing Ceilheat's three types of radiant cables, are now available from Ceilheat, Inc., 5212 Homberg Dr., Knoxville, Tenn. One folder features the Aristocrat radiant cable for plastered ceilings, another describes Ajax radiant cable for concrete floors, and the third describes Dri-Cell radiant cable for dry-wall construction.

1253—Power Connectors

A completely new catalog (No. 526) of power connectors and bus support clamps is now available from Southern States Equipment Corp., Hampton, Ga., superseding catalog No. 525-R. Furnished in a handsome 7-ring binder, the new catalog includes sections on bus support clamps, couplers and angle braces, bar connectors, Tee connectors, stud connectors, ground connectors, parallel clamps, and terminals.

1255—Electrical Tools

Tools for electrical construction, such as Hydraulic Benders, Hydraulic Pipe Pushers, Knockout Punches and Hydraulic Drivers, Cable Pullers, Screw Anchor Expanders, Pipe-Size Bits, etc., are shown in Catalog No. 35-E, published by Greenlee Tool Co., 2136 Twelfth Street, Rockford, Ill.

1257—Centrifugal Roof Ventilators

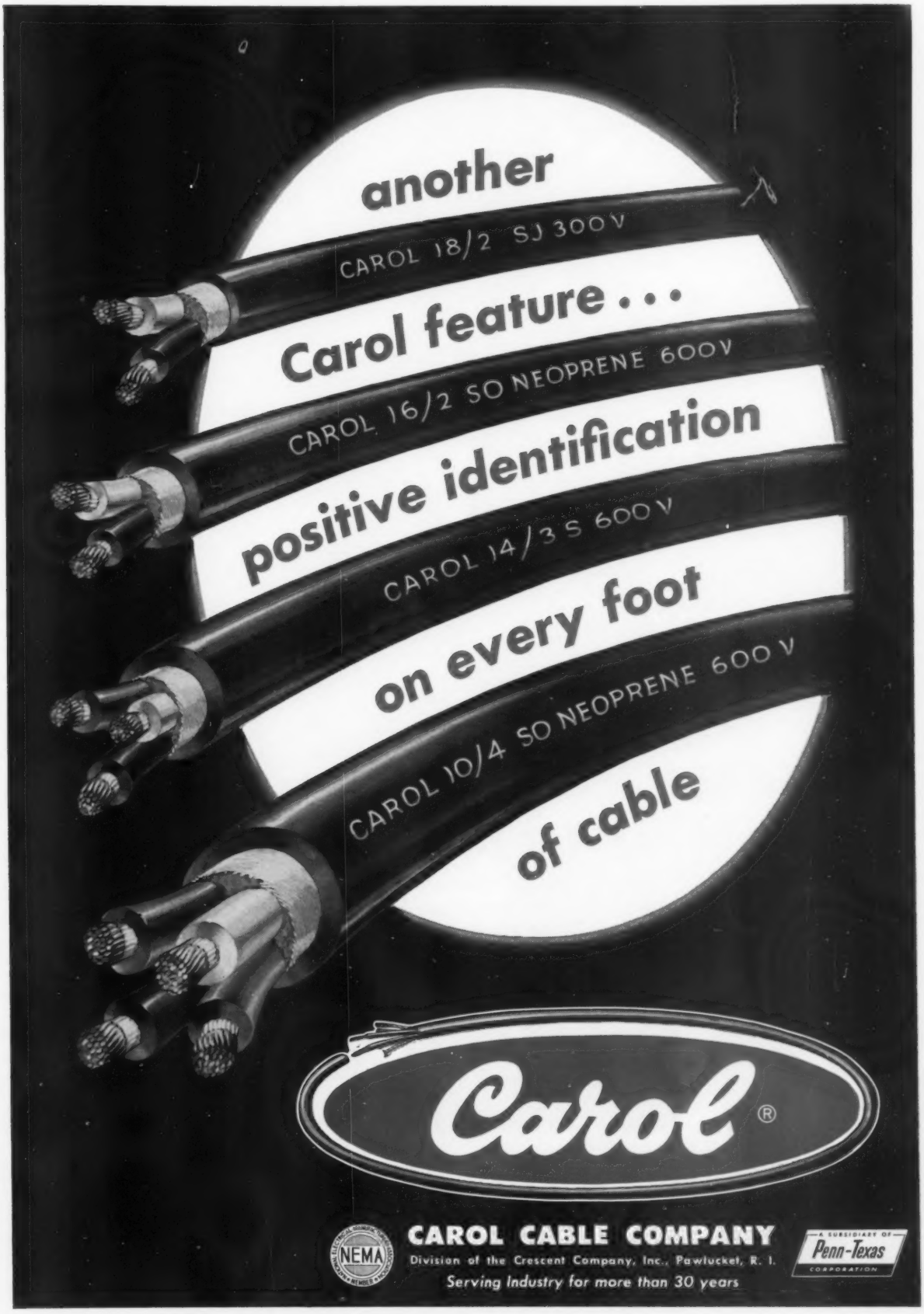
An 8-page, two-color folder (SDA-220) giving construction features, performance data, dimensions and recommended specifications for the new Centrifugal Roof Ventilator manufactured by The Peerless Electric Company, Warren, Ohio. Other important Peerless Fan and Blower products and a list of Peerless sales representatives are also included.

1259—Electrical Tapes

Twelve pages of specifications and application data make up an attractive booklet on Dutch Brand Electrical Tapes. Plastic, friction, and rubber tapes, as well as a vinyl tape made in nine different colors, are available from Dutch Brand Division, Johns-Manville, 7800 So. Woodlawn Ave., Chicago 19, Ill.

1261—Cable Puller

The electrically powered cable puller manufactured by The Barth Corp., 12650 Brookpart Rd., Cleveland 30, Ohio, is described in a new booklet. This tool is ideal for industrial and commercial construction and maintenance.


another
CAROL 18/2 SJ 300 V
Carol feature . . .
CAROL 16/2 SO NEOPRENE 600V
positive identification
CAROL 14/3 S 600 V
on every foot
CAROL 10/4 SO NEOPRENE 600 V
of cable
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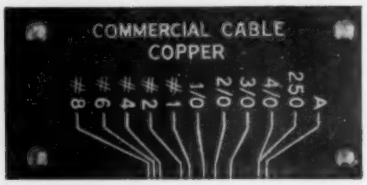
Division of the Crescent Company, Inc., Pawtucket, R. I.
Serving Industry for more than 30 years
A SUBSIDIARY OF
Penn-Texas
CORPORATION

MY29 HYTOOL connects No. 8 thru 250 Mcm cables . . . without changing dies!

No die inserts to change . . . to identify . . . to store or mislay! A twist of the wrist, and you're ready to connect *any* of the wire sizes . . . with a single stroke! The cable-size scale (below) positions the nest die. Two such scales, one on each side of the tool, *double* its versatility. In addition to commercial cables, MY29-type Hytools also install mining, aircraft, and flexible and extra-flexible cable, aluminum building wire, and other special conductors. This rugged, lightweight tool is inexpensive, too



only . . . $36.00

Ask your Burndy distributor for a demonstration.

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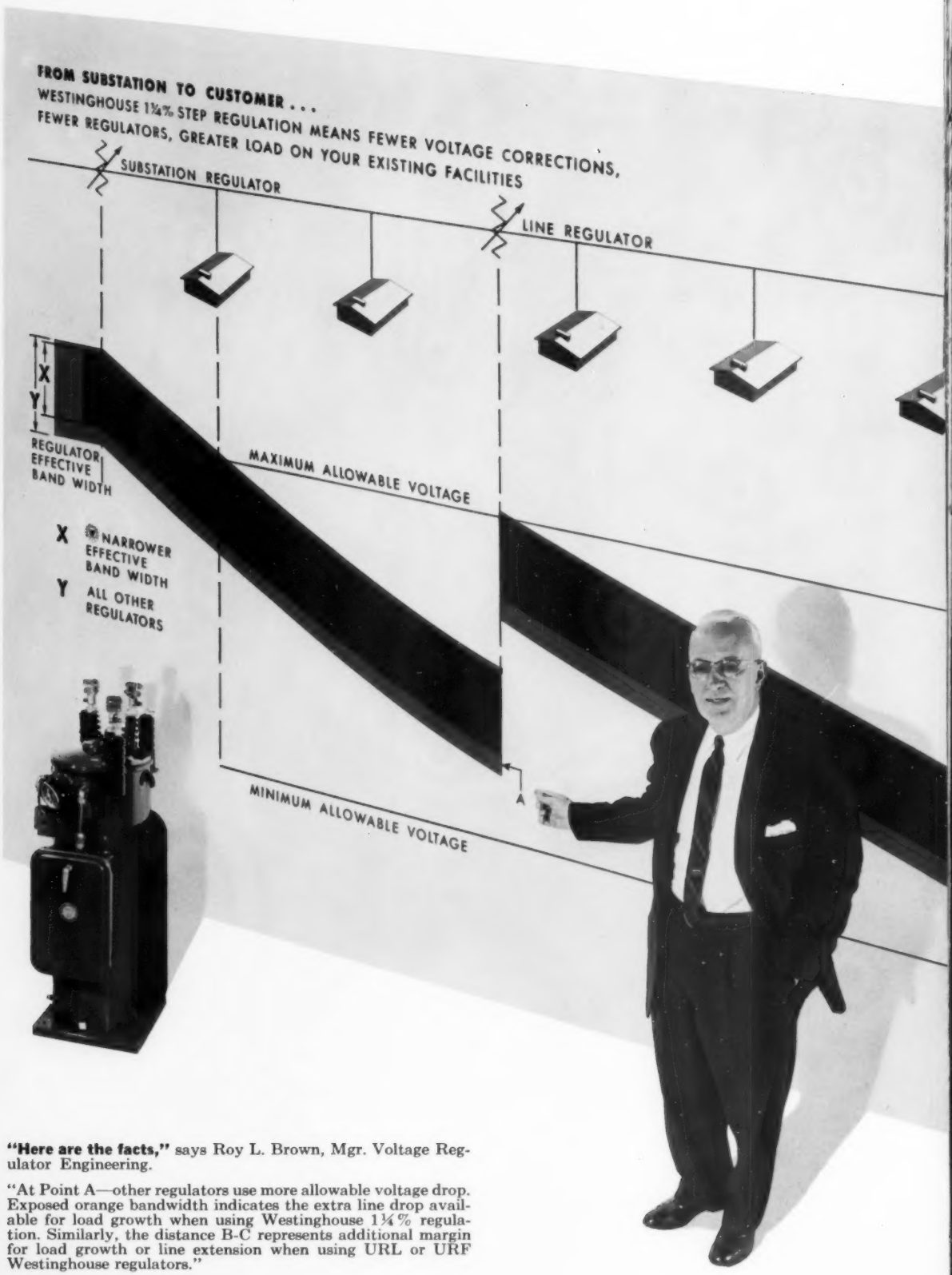
REGULATOR NEWS

Westinghouse extends advantages of 1¼% step regulation to higher kva ratings

Left—URF regulator extends range of 1¼% step regulation . . . reduces your initial investment for regulators up to 167 kva.

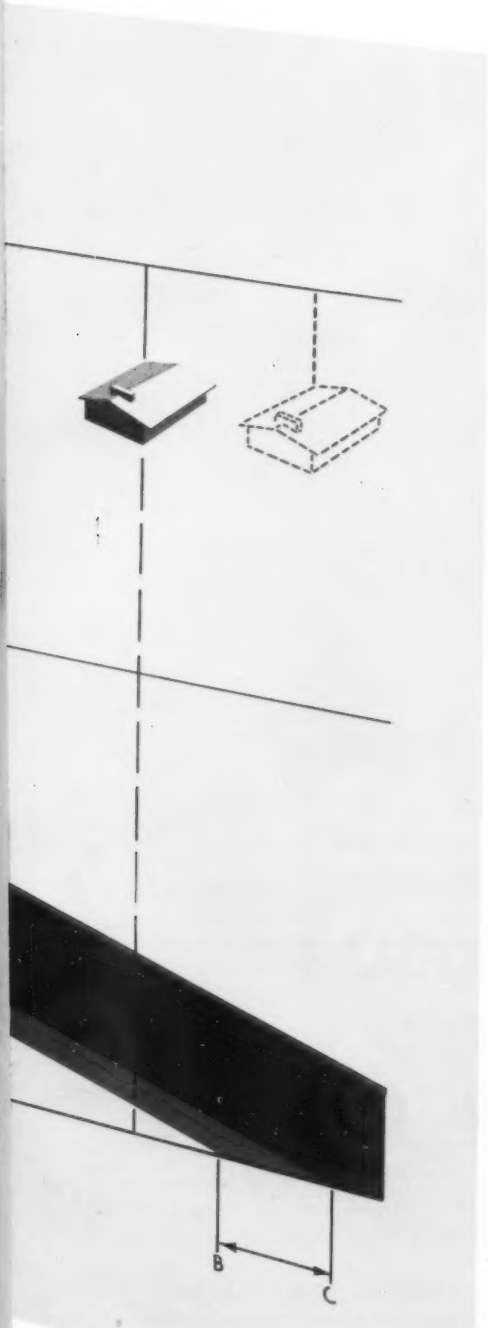
Right—URL regulator . . . over 10 years of field experience has proved the superiority of 1¼% step regulation.

YOU CAN BE SURE...IF IT'S Westinghouse



"Here are the facts," says Roy L. Brown, Mgr. Voltage Regulator Engineering.

"At Point A—other regulators use more allowable voltage drop. Exposed orange bandwidth indicates the extra line drop available for load growth when using Westinghouse 1¼% regulation. Similarly, the distance B-C represents additional margin for load growth or line extension when using URL or URF Westinghouse regulators."



It's a fact . . .
Westinghouse 1-1/4% step regulation

holds narrowest effective bandwidth, gives you more revenue

Westinghouse 1-1/4% step regulation more effectively meets the three basic distribution voltage conditions — you gain a narrower effective bandwidth; permits heavier loads, less line equipment.

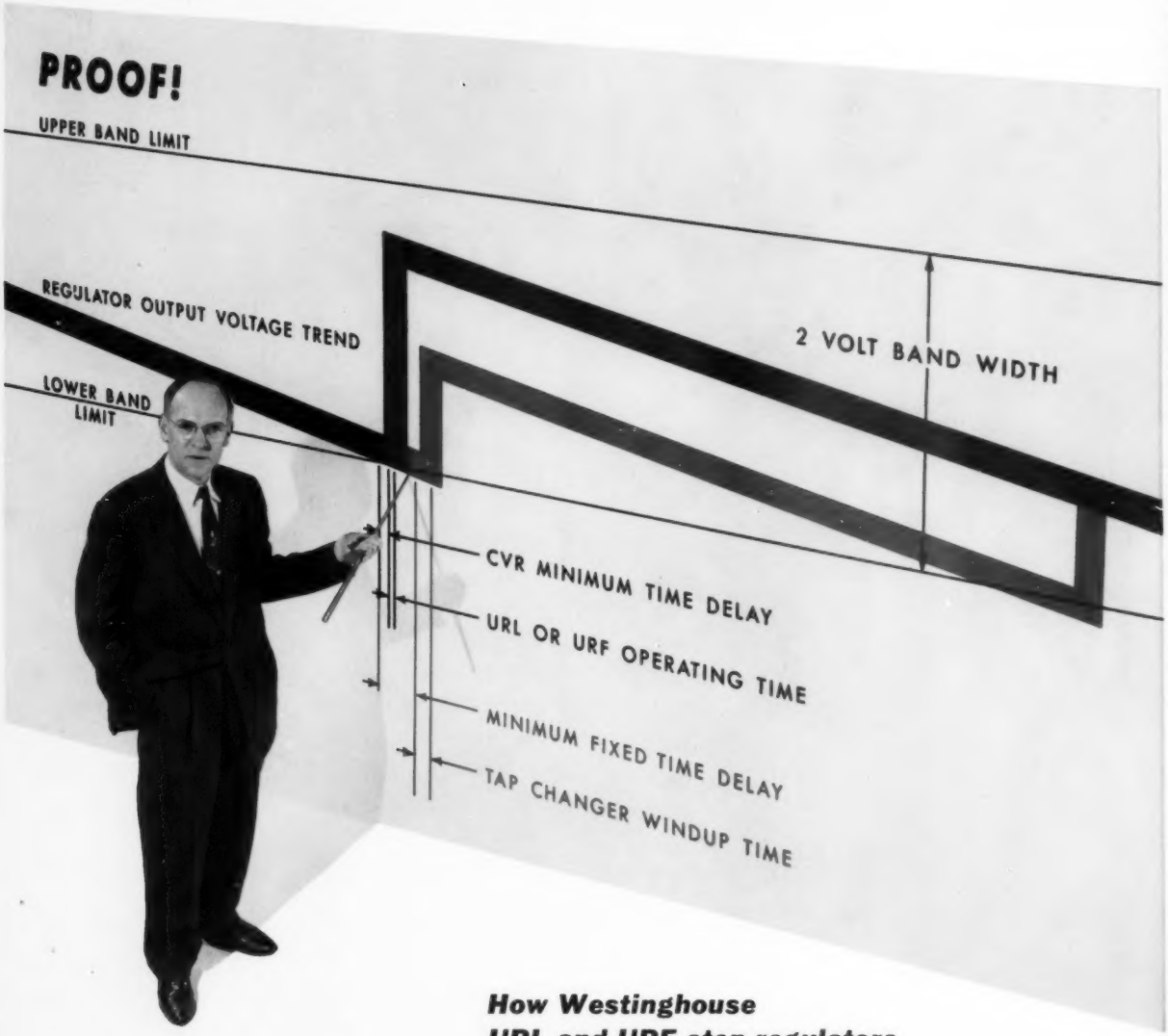
Here is what Westinghouse new URL and URF step voltage regulators can do for you:

1. Save you money because satisfactory voltages can be furnished to loads farther out on the line.
2. Increase revenue by allowing heavier loading of existing lines, hold effective regulator voltage bandwidth closer to the limits set on the control.
3. Because of faster relay operation on large voltage changes and a tap changer that responds 15 times faster than other types of mechanisms, URL and URF regulators provide protection against runaway voltages which can damage user equipment.
4. Make possible a minimum total regulation equipment investment:
   (a) Longer lines
   (b) Fewer regulators
   (c) Deferred expansion to meet growing loads

YOU CAN BE **SURE**... IF IT'S Westinghouse

This is system operating flexibility you get with no other regulators

HERE'S WHY . . .



How Westinghouse URL and URF step regulators

meet all THREE basic voltage conditions more effectively

SMOOTH VOLTAGE CHANGES

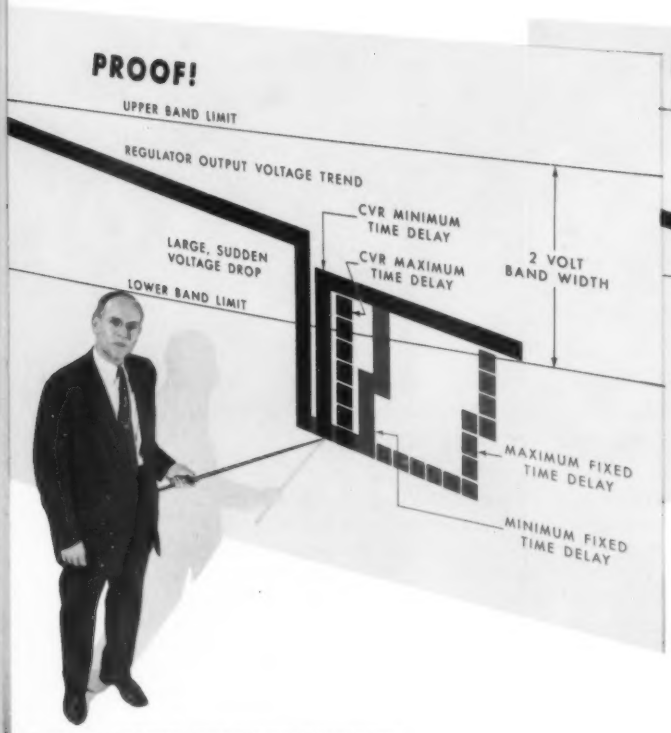
Fixed time delay on ordinary regulators allows voltage to go outside band limit before operation. The Westinghouse CVR induction disc relay "reads" voltage. When lower or upper band limit is reached, contacts close; instant-response tap changer corrects voltage 15 times faster than other tap changers.

RESULT . . .
A NARROWER EFFECTIVE BANDWIDTH

THE PURPOSE OF A REGULATOR is to maintain an effective voltage level which will provide top operating revenue consistent with the least possible equipment investment and minimum maintenance.

THREE EXCLUSIVE WESTINGHOUSE REGULATOR FEATURES give you this optimum voltage correction. (1) The unique new CVR voltage regulating relay with integral, adjustable, inverse time delay; (2) the instant-response tap changing mechanism, and (3) the 1¼% step giving regulation on a 120-volt base of 24 volts in 16 steps of 1½ volts each.

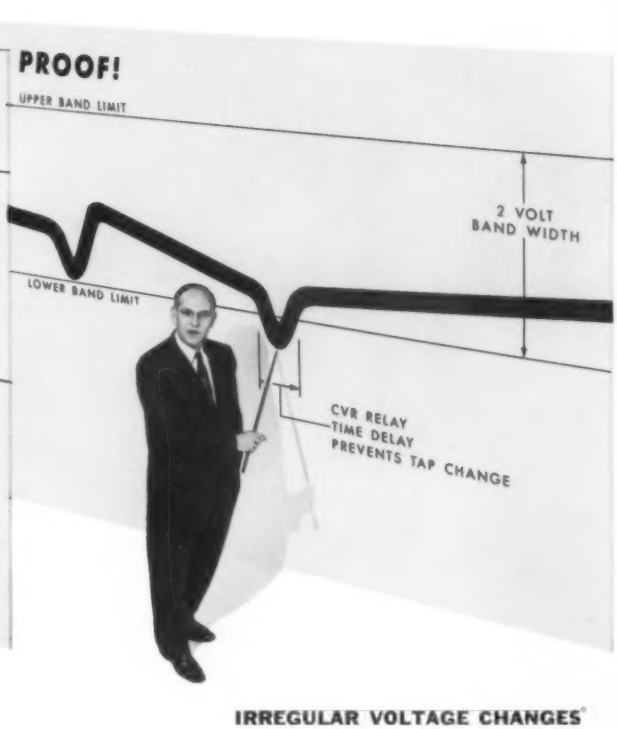
YOU CAN BE SURE...IF IT'S



LARGE, RAPID VOLTAGE CHANGES

CVR relay disc accelerates to close contacts and operate instant-response tap changer in a fraction of the time taken by other regulators. Because of the fixed time delay of ordinary regulators, steep voltage changes may run voltage so far above or below set band limits that two or more ¾-volt steps are required to bring voltage within the band. Westinghouse regulators, however, offer the quickest recovery under such voltage conditions.

RESULT . . .
A NARROWER EFFECTIVE BANDWIDTH



IRREGULAR VOLTAGE CHANGES

Westinghouse CVR relay induction disc with its damping magnet integrates voltage and time; its inverse time delay characteristic prevents relay and tap changer operation during self-correcting conditions.

RESULT . . .
NO UNNECESSARY OPERATIONS

New CVR relay "reads" voltage, evaluates need for correction, eliminates unnecessary tap changes

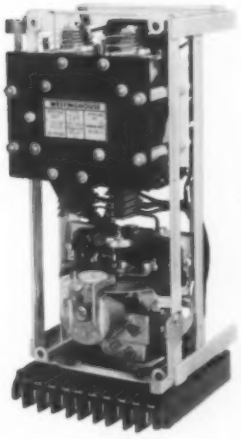
CVR voltage regulating relay is an induction disc device with built-in inverse time delay characteristics. On a smooth, slow-changing voltage (Figure 1), the disc position will follow the voltage, and will close contacts to start corrective action by the tap changer whenever voltage reaches pre-set band limits.

Ordinary regulators with fixed time delay allow wider voltage deviations from set limit.

But in the Westinghouse URL and URF regulators, the CVR relay operates immediately . . . voltage is restored to within band limits. Result—narrower *effective* bandwidth.

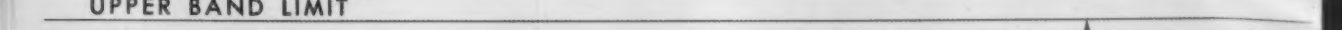
On large, rapid voltage changes, such as may result from switching in other parts of the system or from rapid load changes (Figure 2), the CVR relay disc *accelerates*—contacts are made, and again corrective action by the tap changer starts immediately. Voltage is quickly restored to normal. Result—narrower *effective* bandwidth.

Finally, irregular voltage changes (Figure 3), such as result from motor starting, are usually short-time, self-correcting disturbances. The Westinghouse CVR relay disc integrates voltages —automatically provides time delay through the averaging effect of the damping magnet. Prevents unnecessary operations which would lead only to increased maintenance.



Unique new Westinghouse CVR relay with inverse time delay characteristics . . . provides best voltage regulation available under all voltage change conditions.

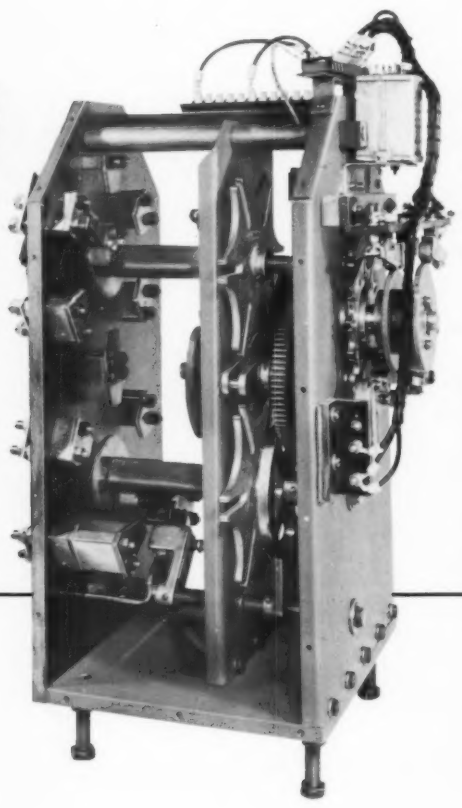
Westinghouse

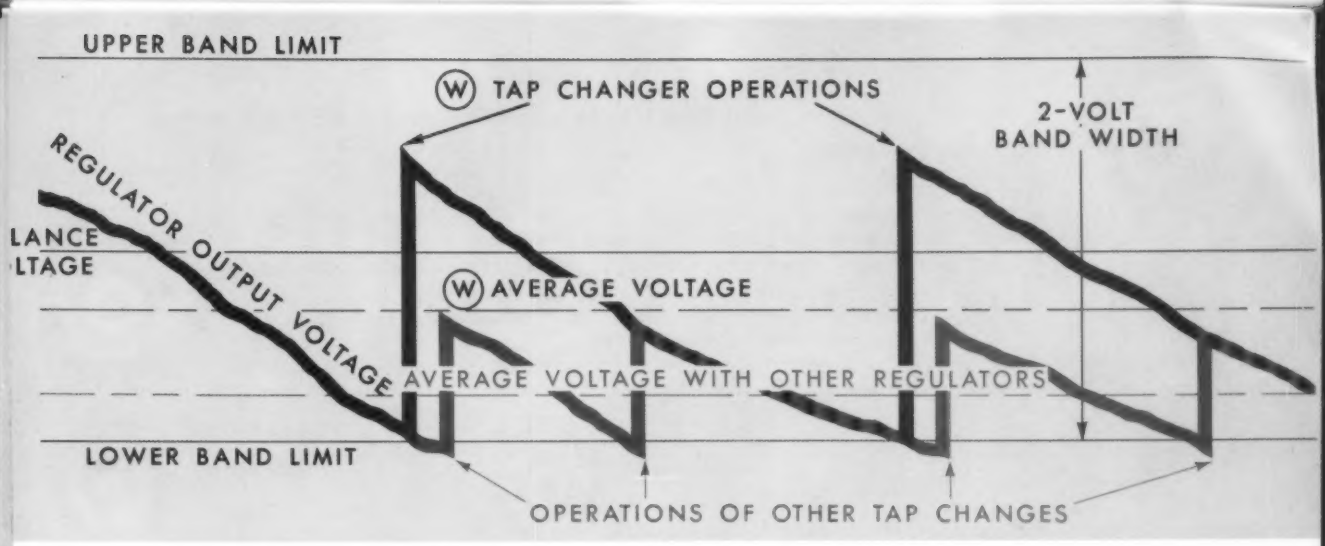


Instant-response tap changer corrects voltage . . . 15 times faster than other tap changers

How Westinghouse direct-drive Geneva gear tap changer and CVR relay work together to achieve narrowest effective bandwidth

The *direct-drive Geneva gear* tap-changing mechanism responds instantly to the command of the voltage regulating relay. As soon as the relay contacts close, the tap changer motor starts driving the Geneva pinion. No windup time is involved. The pinion engages the Geneva gear and immediately moves the tap changer contacts to the next position. The advantages of directly driving the Geneva gear are dramatically illustrated in a comparison of time required for Westinghouse regulators to traverse from maximum raise to maximum lower with that of other regulators. The directly driven Geneva gear can, if so directed by the CVR relay, operate the tap changer over full range in only 13 seconds. Other drives require 3½ to 5 minutes from maximum raise to maximum lower. The elimination of this unnecessary time delay further contributes to A NARROWER *EFFECTIVE* BANDWIDTH.





Effective voltage of 16-step regulation is closer to balance voltage . . . with fewer operations

When a 2-volt bandwidth is used, the voltage level will always be more than one volt from the balance voltage when the relay initiates a tap change. With its 1½-volt steps, the Westinghouse URL and URF tap changers will bring voltage back to the balance level with a single operation; whereas, a ¾-volt step regulator will never bring voltage back to this level.

Westinghouse 16-step regulation means . . . 42% fewer operations, 15% less contact erosion. Result? Reduced maintenance, longer life

Optimum contact speed minimizes burning

Contact speed and burning are directly related—excessive burning of contacts will occur with either too slow or too rapid contact break. The former delays arc extinction, the latter frequently causes flashover between stationary contacts. Exclusive Westinghouse direct-drive Geneva gear mechanism consistently assures optimum speed. Arc extinction is achieved at first current zero. Flashover is eliminated, burning minimized, contact life significantly lengthened.

Contact burning and frequency of operation

Contact burning or erosion does not increase directly as the size of the step; therefore, the contact burning for one 1½-volt step is less than for two ¾-volt steps. Tests have shown that, on the average, the 16-step tap changer makes 42% fewer operations than a 32-step tap changer, and that the 16-step contacts average 15% less erosion for the same service. These two factors make 16-step operation result in reduced maintenance and longer life.

YOU CAN BE SURE...IF IT'S Westinghouse

Here is what new Westinghouse URL and URF regulators do for you:

- Hold a narrower *effective* bandwidth
- Provide protection against runaway voltages which can damage user equipment
- Increase revenue by permitting heavier loading of existing lines
- Save you money because satisfactory voltages can be furnished to loads farther out on the line

ADD TO THIS THE WESTINGHOUSE LOAD RANGE SELECTOR . . . allows higher currents at reduced range operation. With LRS, you get increased capacity on all URL-URF regulators . . . 160% of rated current at plus or minus 5% regulation up to 400 amperes.

Only Westinghouse offers these moneysaving product features:

- Separate tap changer compartment
- Inverse time delay relay
- Direct-drive Geneva gear tap changing mechanism
- 42% fewer tap changer operations
- Longer life contacts
- Corrosion-resistant tank

Get more revenue for power delivered. Specify new Westinghouse URL-URF regulators on your system. J-70804

YOU CAN BE SURE... IF IT'S Westinghouse

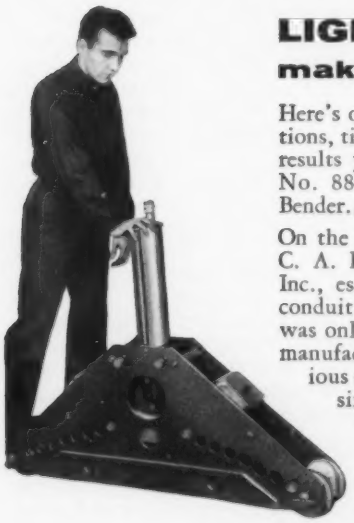
new... fast...

HIGH-POWERED BENDER

for PIPE and CONDUIT up to 4"

Typical 90° bends made with one ram stroke of a GREENLEE Bender on the job of Rockford Industries, Inc. A total of 500 bends in 1¼" through 3" conduit were made for this new plant installation with fast, portable GREENLEE Hydraulic Benders. Note smooth appearance, accurate alignment of conduit runs.

GREENLEE No. 884 Hydraulic Bender at work on new National Lock Company Plant job by Rockford Industries, Inc., electrical contractor, Rockford, Ill.



LIGHTWEIGHT GREENLEE No. 884

makes full 90° bend with one ram stroke

Here's on-the-job proof of the cost reductions, time savings, and better installation results you get with the new GREENLEE No. 884 Hydraulic Pipe and Conduit Bender.

On the job, illustrated above, Supervisor C. A. Pottinger of Rockford Industries, Inc., estimates that the cost of making conduit bends with the GREENLEE No. 884 was only about one third of that of using manufactured bends. Bending of the various sizes of conduit needed was fast and simple. *Ability to make a 90° bend with one ram stroke and minimum setup time meant big time savings.* Easy wheeling of this lightweight bender to many locations and easy insertion and removal of the conduit from the front of the bender added extra efficiency to the job.

Make your installations go faster, too, at less cost with this powerful new GREENLEE No. 884 Hydraulic Bender. Makes a full 90° bend *in 4-inch pipe* in only *4 minutes* when operated with the GREENLEE Power Pump shown above. Handles 10 sizes of conduit from ½" through 4" . . . only *one* pipe support needed for all sizes. Fast, easy to operate, lightweight, portable . . . one of the most important equipment investments you can make today!

SEE YOUR ELECTRICAL DISTRIBUTOR
for the complete story on this advanced new bender that speeds jobs, cuts costs. Or write direct for new descriptive Bulletin E-224.

TOOLS FOR CRAFTSMEN
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GREENLEE TOOL CO., 1789 Columbia Avenue, Rockford, Illinois

Pros and cons of maintenance

A comprehensive survey conducted by ELECTRICAL SOUTH uncovers interesting facts on electrical maintenance service as a specialty for electrical contractors: why some fail in this demanding field while others find it a steady source of profit.

◆ THE QUESTION of desirability and profit possibilities of electrical maintenance work—service and repair jobs—is one that instantly and automatically splits most electrical contractors into two groups.

A very few *prefer* such maintenance work to new-construction work and do most of their volume in service. But most don't like it, whether they do any or not. Some do no electrical maintenance work at all, except to get "bugs" out of their own installations. Many others do it in a limited way, under protest, to make work for their men during dull times.

The average well-known long established, and well-rounded contractor doesn't solicit this work widely, but has a small maintenance department—maybe one to four electricians of broad experience—which periodically serves old customers and good industrial prospects who see eye-to-eye with him on service prices, and whose goodwill is valuable in case of future plant expansion or remodeling. When not busy on service, these specialists work on installation jobs.

This majority has been new-construction - minded, especially during the current building boom. Many of them keep service departments, if any, as small as possible. They are made up of contracting firms of all sizes, whose managers simply think first in terms of sizable installation jobs and potential quick profits.

Most have discovered that their new-construction methods and personnel get poor results when applied in volume to miscellaneous repair problems. To them, it's often a continuous series of headaches, with scant reward and much wrangling over charges.

Most contractors dislike what they call the pettiness and uncertainty of a great many repair jobs; so they haven't made a wholehearted study of factors necessary to success in it.

In good times, they concentrate on bids for new work. In slow times, when turning to service jobs as "stop-gap," they find they haven't the technique or personnel to handle the work efficiently in volume and at competitive prices.

Taking run-of-the-mill maintenance jobs with run-of-the-mill electricians, they often lose both goodwill and money, if figuring supervision, office and collection costs, overhead, and bad debts separately on service operations. Close selection of both preferred customers and their own repairmen is practised by most successful service firms.

Of course, contractors in various areas may differ in their interest in service work. In more stable and small-town areas, where building expansion rates are normal, firms may be more interested in getting maintenance jobs. However, in some areas that have been experiencing a building boom, many contractors are definitely "high-hatting" service work.

Maintenance contracting success qualifications

The minority, which really like regular service work, specialize in it either as a main business or as an important specialized department. They have, without exception, spent time, money, and thought to perfect an organization suited to continuous, systematic trouble-shooting.

Most are medium-sized firms, whose owners are mechanics at heart and non-speculators by temperament. They relish the security of a more stable business, less subject to drastic ups and downs and business cycles, even though some do a limited amount of new work as a "cushion" to keep their service men fully employed at all times.

They regard varied trouble-shooting as a challenge to their abilities, and thus have the patience to deal with a continuous stream of small electrical and human problems.

These successful firms have carefully selected and trained over a period of years a regular crew of conservative, "settled" workmen who likewise prefer a stable business and an assured annual wage. Electricians who are temperamentally suited to contacting the public, and men who like to work "on their own" and learn to diagnose varied electrical troubles, mainly comprise the group. The very diversity of their daily problems appeals to some electricians, as it does to their bosses, and they find it more interesting than regular construction work.

These successful service companies, whether or not they do varying amounts of new work, have, without exception, provided and equipped special service trucks, mostly lightweight vehicles, to carry a standard skeleton stock of varied parts and materials. These firms also keep a broad inventory in their warehouses and stock rooms, in most cases even a larger and more varied stock than kept by new-construction firms.

They keep at least one experienced maintenance specialist in the office, and a service manager who coordinates service calls, material deliveries, credit rating, etc. These firms also have as many estimators or supervisors as needed in the field to check calls, sell sizable jobs, lay out work, plan ma-

terial deliveries, and allocate extra personnel when needed.

Service calls are routed from the office so as to group those in specific areas. Some firms find two-way radio sets in the trucks helpful for this. This medium can speed service and cut mileage involved in retracing "steps," and help trucks to swap materials, tools, and extra men. But a good job can be done without radio if men phone the office after every call. Radio can't reach the men while they're working on a job, and it does add investment expense and often waste office time when used to "raise" men while they're working. However, the big firms with many men in the field like it.

Most service companies limit business, within reason, to commercial accounts which they feel will be profitable; and some firms are more selective in this respect than others. While most maintenance jobs are done on a time-plus-material basis, regular service firms, in special cases, quote approximate prices in advance when it appears that the customer might not expect to spend enough to do the job right. Small jobs with new customers without ratings, as well as some residential work, are often handled C.O.D.

Residential jobs, on the whole, are not solicited by most firms, which make an exception only when such homes may belong to their commercial customers or substantial prospects. Residential work has a future, however, because most old systems are inadequate for modern service needs. If general business slows up, alterations in selected homes will become more attractive. Added capacity, flexibility and safety are the selling points used to get this work.

Service contractors definitely prefer substantial industrial accounts. Some trouble-shooters make a real study of the electrical systems and special needs of all, regular factory customers. They also provide preventive maintenance whenever they can sell owners on the certain long-range economy of this feature. Most firms strive to stock special parts and equipment likely to be needed

by these plants. For many such special installations as hospitals, dairies, etc., alternative motor units are often kept on hand for quick substitutions.

One of the main problems is that service management, knowing that capable service electricians are hard to get and hold, make it a point to keep the good ones fully employed. Some do this when necessary by bidding on a small-profit margin for new work on which there is no real rush. They also see that each man gets his share of overtime, to boost pay checks. On sizable staffs, there are super-specialists who handle the tricky jobs, such as electronic equipment—and often the owner-manager is a master electrician. Flexibility of personnel is possible because service specialists can easily work on new installations, where as not all regular electrical workers can do mixed trouble-shooting efficiently without supervision.

Emergency calls

Emergency calls are handled on a 24-hour basis if important, and some contractors have estimator-engineers, foremen, and inside shop men who go out on such calls when the work-load is heavy. Good maintenance firms make every effort to give fast service when customers are in real trouble, and one main advantage of specialization is that trained men can make a quick and sound diagnosis of breakdown causes, which speeds repair, saves money for the customer, and gains future work for the contractor.

As one contractor declared, the firms which have succeeded in service work have, from the beginning, taken it as seriously as other firms do new installation jobs, and have, as a consequence, developed an equally-efficient system. Most try, not merely to "patch up" the immediate and localized trouble spot, but to survey the whole system, as time permits, and to offer long-range remedies, including re-engineering and remodeling to prevent future troubles and reduce plant "down" time.

Service managers have usually studied their failures, both electrical and human, and have eliminated or minimized as many basic causes as possible. Instead of merely recoiling from "bugs" and headaches, they have wanted to lick service problems so badly that they have really faced the facts involved and analyzed them! With this different point of view and the resulting improved systems and personnel, they have naturally gotten better results. All good contractors do the same thing with their new installations, but some neglect to extend it to service jobs.

Price-cutting competition involves borderline group

In addition to the two basic groups of contractors who are definitely for or against service work in their fundamental attitudes and preferences, there is a third borderline group which does repair work only when it suits its purpose. This includes small contractors, just getting started, who do such jobs cheaply in order to gain experience and make business contacts for future installation jobs.

These firms have trouble giving quick, efficient service as their business increases, because they don't have enough skilled men and can't get them quickly. Also, they find the profits are slim, and when they raise prices to include overhead, they have to compete with more efficient organizations. They quit service, as soon as they can get enough new work. But new firms are opening all the time in expanding areas, and their temporary price-cutting hurts the industry.

This borderline group includes firms of all sizes, even very large ones, which feel the need to go back into service work for a while when new construction slows up, in order to keep their men employed. They sometimes put out a lot of ads and flyers, and for a while tackle every job that comes in. The larger they are, the more they need the efficient service organization which they don't have, and the more trouble they find in supplying enough supervision without running their costs up too high. All these off-and-on firms quit repair work as soon as new work picks up; some however, hold on to a few old customers.

Word of warning

A word of warning: trade observers feel that even with improved methods, it is not desirable for all contractors to go heavily into service work. Even considering their individual temperament and interest, it is a specialized field, requiring long and concentrated effort; and there's a saturation point in any industry for specialists. When a service firm has made a big investment in time and money, it must thereafter maintain sufficient volume of work to support its organization. With too many qualified firms in this field, competition both for jobs and for selected personnel could be destructive. After all, a well-heeled contractor relying on new work can pull in his belt, take care of his supervisors, and ride out a dull period. But, if a service firm has to let many of its regular trained repairmen go, it's in trouble! On the other hand, the service field is less affected than others by economic cycles, most contractors feel that it is not likely to be over-supplied.

Trade sources say that it is a question of improving the quality of service, and going after the remodeling work that is being neglected, rather than the switching into service for major volume. They believe that if a contractor is going to do any maintenance at all, and most well-known firms have installation customers and prospects which they can't refuse, he should do it in a separate department setup organized and equipped for such purpose. They say that if a firm learns how to handle this business properly, even on a small scale, it will have a specialized skeleton organization with enough experience to expand the department later if need be. And it can be sure that a sound, specialized repair department will make many new contacts for it with a minimum loss of goodwill through inefficiency or overpricing.

Observers insist that an efficient service department is the best way to line up remodeling jobs. With mortgage money still tight, and the national building rate now at the lowest level in

eight years, they declare that increased diversity of income should not be taken lightly. It adds flexibility to business, and the added work can be selected and controlled in volume. Certainly the firm which has been servicing a plant, regularly and well, has the inside track, the familiarity with the system and the owner's confidence when a remodeling job comes up.

Even admitting that every man should "stick to his last," industry analysts feel there is something wrong in the fact that more than half of all electrical contractors in many areas simply refuse to think constructively and impartially about maintenance problems. They find it easier to ignore them in good times.

It is pointed out that service, with a capital "S," is the mainstay of many other industries, and that many prospects make their main purchases where they can be sure to get help when needed. In the automobile business, in appliances, and other lines, follow-up service is all-important, and the steady revenue, derived from it in the long run is the key to profitable operation. Service is also a criterion which divides solid merchants from the discount houses and such.

Since this country has the largest number of substantial electrical systems which are constantly getting bigger and more complex, it is obvious that someone is going to make a lot of money from maintaining them for many years after installation and during times when rapid expansion levels off. The opinion is that much of this service work is now being done inefficiently. So despite acknowledged difficulty, it bears looking into. It's the responsibility of the whole industry, trade observers declare.

Some real problems met in maintenance service

One of the real maintenance problems is that overhead costs are proportionately larger on service jobs. One contractor figured them to be 50 or 60 per cent of the bill on small jobs, or an average of 30 to 40 per cent, whereas, on a large new installation, it is possible to hold them down to 10 to 12 per cent.

It is believed that many small firms which start out doing cheap service work, only to quit, do so because of failure to keep records and charge part of their overhead to every job. The large companies which quit service, do so because their better bookkeeping shows exactly where they are losing money—on the big overhead on small jobs. Good office management can cut this some, but the main way is to have individual skilled repairmen who can diagnose and do small jobs by themselves with a minimum of supervision.

Several optimistic case histories of successful service operations with specific and helpful details appear later in this survey. But to show what a tricky business it can be without planning, some common complaints will be discussed first.

By all odds, the biggest difficulty reported is the getting and keeping of skilled electricians, suited to miscellaneous repair work. When new buildings are going up with overtime available, electricians can make more money on these jobs. Many prefer to make big money and then lay off for a while. Most like to work with a gang under a supervisor who takes all responsibility. Some like moving from job to job.

Schools for service men

Union officials admit that few men like or do well varied repair work. The union tries to select suitable men for service firms. It even sets up schools to train them for the electrical end of air conditioning, etc. But it is up to the contractor to select and hold these skilled men and train others. So far there has never been enough, especially for large firms.

A matter of importance is the fact that a service manager can't afford to send out a supervisor on every small job. It's too expensive. He must have men who can be trusted to size up and lay out their own work. Jobs that have to be done over, or on which bills require adjustment, spell loss of profit and goodwill.

Repair collections

Another common complaint is about small repair collections. The union permits the electrician to make C.O.D. collections, but he must use judgment in warning some customers about the bill, and the necessary charges on small jobs sometimes take a lot of explaining. Even on sizable and good-credit jobs, the boss has to make a later trip to explain the charges. This is the main reason why customers are *selected* by most firms.

On the good-sized jobs an estimator-engineer or supervisor quotes the job and lays out the work, and also checks it later. Even though it runs up their costs, most of the sizable service firms feel they must have supervision of this sort. For one thing it makes it possible to use men on sizable jobs who can't handle a job alone.

As an example, one of the largest contractors in a big Southern city tried to handle a large, mixed service volume with too little field supervision. He lost so much money that he gave up the service business, except for a few old customers. He had advertised widely, had a big office staff, a large number of trucks, and took on all service calls, some on a 24-hour basis; but inefficient field personnel and collection troubles made the business unprofitable.

Even among retail business firms, there are those who question bills for ordinary jobs. Keeping complete records, and being able to both know and show why costs are high, is part of normal expense of a service business—and this customer education, and eventual selection or elimination of individual accounts, costs money.

Other complaints are that calls come in bunches; that, even with a good-sized inventory, some part or material is always lacking; that you never know whether a job requires one or two men, that factory maintenance men have to be handled with kid gloves; that your men often receive bad tips that waste their time; that night work is a headache and good men don't like it in the field or in the stockroom; that night work upsets daytime schedules; and that overtime is hard to collect.

Service men say that these things are routine and that a good

organization takes them in stride. Good office management, they say, can schedule important work first, can switch reserve help from other jobs; can develop a good inventory-control system and stock critical parts for regular customers; can get full information on trouble over the phone and rush an extra man when needed; can keep a file on each customer's system and the electrician familiar with it; can avoid taking on too much work for the size of the organization; can stretch a point for a valuable new customer; but avoid letting "trash" calls run it ragged.

Several contractors during this survey discussed integrity in service work. They indicated that with one or two men working on their own on small jobs, there is more chance of soldiering or finagling than with a crew under a foreman. Also, when some firms try to "make work" for the men, bills get padded.

Service bosses are well aware how suspicious the layman feels about technical things he doesn't understand, like TV and electrical repairs.

Good companies, therefore, instruct their men to assure a fair deal to every customer. The job records soon spot malingerers. Strangely enough, some new men have to be told that the boss doesn't want to run up the bill. The repairmen will take their cue from the "top" on this, and nothing will do the firm any more good than specifying a clear-cut policy in this regard.

Actual case histories of typical maintenance firms

The three following case histories of successful electrical maintenance service companies give a well rounded picture of varying types of operation: a large firm specializing in service almost exclusively; a smaller company which does the same; and a relatively large business which divides its volume between new and repair work. Each observes fundamentals previously stated, but with variations suitable to size and situation.

The large maintenance specialist —and even the largest Southern cities can support but one or two of this size which does service exclusively — operates a fleet of twenty service trucks with an elaborate supervisory system, including two-way radio, in every vehicle.

He has an elaborate and expensive accounting system, with detailed figures broken down for every job and type of job. The monthly cost of this leased, nationally advertised machine accounting system is greater than some contractors' whole service departments. These records show that overhead costs are higher than many service firms realize, especially on the general run of miscellaneous calls.

Part of the overhead is due to the five or six supervisors which this firm finds necessary to keep in the field most of the time to select good jobs, lay them out, or eliminate others.

About 75 per cent of its work is for industrial and commercial accounts, and the balance for home owners. Skilled men are nightly rotated on call through a switchboard answering service. They handle about 5,000 accounts, and make around 500 calls a week within a 40-mile radius. Company specialists work on electronic equipment, including control systems and rapid-cooking equipment for restaurants.

Service truck layout

In this organization, two-way radio works well for coordination and consultation. Service trucks have a special uniform layout of compartments and drawers so that each has the same material in the same arrangement. This permits any man to find what he wants in any truck and speeds up regular inventory check of varied materials carried in each vehicle.

This firm stresses a comprehensive management system, an institutional advertising campaign to build up their reputation, and a merchandising approach to the public on volume business. Their service men wear company uniforms and handle prospects with the same sales approach you would expect in a good retail store.

The total investment is large and promotion aims at securing volume to support it. Their costs are high, but meticulous accounting enables them to reduce some costs, to set reasonable prices and to determine what jobs to stress. Their further expansion is already limited by the scarcity of men suitable for training.

The smaller service specialist, interviewed for contrast, has seven specially equipped service trucks. He does only about 2 per cent of his volume in new construction, just enough to satisfy service customers and have a little reserve backlog of work for his service electricians. He does around 20 per cent of his volume in remodeling for substantial regular customers, and the balance in all-around service for selected regular trade, mostly industrial customers.

This contractor, and other small-to-medium service specialists, are fortunate in that they don't need a great number of electricians, and they have a small select staff of picked men whom they have known for many years. The close personal relationship with these men inspires confidence and loyalty on both sides, and the boss can send any one of them out to diagnose any trouble and do most jobs without supervision. This cuts costs and is pretty tough competition for the big firms to meet. The boss himself also gives personal supervisory service in many cases and this firm has very little "turnover" of customers.

The owner is a mechanic at heart and so are all his men—they take pride in their work and are all "settled" home owners. They get full-time work, a fair share of overtime and can depend on a good annual income. They're not tempted by the high "seasonal" pay of new work. A firm like this can select preferred customers and limit its volume. They need less supervision and have relatively less overhead. Beside the boss, they have a good office manager and one expert master electrician who makes some of the important field contacts and lays out tough jobs.

The office keeps full records on every account, they study customer's needs in advance and get much of their important work from

plants which have their own maintenance men. Top notch men can usually show factory managers how to improve their systems.

Even this type of firm has some trouble with collections, but the boss handles them personally and can always show the customers why charges are necessary. Once educated as to rates and overhead, and seeing how the work stands up, regular accounts are easier to handle.

Only one contractor interviewed thought that, under stable conditions in a thoroughly remodeled plant, he would sign a maintenance contract to keep the system in order for a flat rate per month or year. He believes it would be necessary first to service such a plant for a period, get all the bugs ironed out and accumulate some records on average service costs. He feels that there may be a demand for this some time fairly soon, when plant managers become less volume conscious and more cost conscious as profit margins continue to shrink in certain industries.

However, he feels that the main advantage of such a plan would be in the thoroughly re-engineered and modernized system that would have to be installed. The long-range economy of this would help cut manufacturing costs, with or without flat-rate servicing.

Even so, plant management would have just that much more assurance of controlled costs which would enable them to set their prices on goods with increased confidence.

"Combination" contractor

The third, or "combination" contractor of the selected case histories—the one who does substantial amounts of both new and repair work—operates thirty-two trucks in all, devoting six or more to regular service work. He has radio in some of the latter but feels it's more of an advertising gimmick than a necessity. His estimators and men phone the service manager periodically during the day and after every service contact.

He has a trained service manager, and operates that branch of the business as a separate department. This firm not only has skilled troubleshooters, some of whom have been with them since they started, but they have trained men in their motor repair shop who can be sent on emergency calls in a pinch.

In a real emergency, all the four estimators who are engineers and even the boss himself are available. In addition, he has a number of electricians any one of whom is experienced enough to handle an ordinary job by himself to keep costs down.

Since 85 per cent of his dollar volume is in new work, he always has plenty of work for his repair crew. He gives added "pusher" pay to a semi-foreman on some jobs and this man can graduate to full foreman status later.

While their service work is only about 15 per cent of their gross, it comprises 50 per cent of the *number* of their jobs. They estimate that the average contractor in their area does from 1 to 5 per cent of his dollar volume in service, and they think about half of the total cost of the average service call is in overhead. Complete records of all operations guide them on setting charges, and service records are kept separately from new work.

Industrial accounts

Their best service business is with their industrial accounts and they advertise for this and go after it with personal calls. They have their own motor shop which makes many helpful personal contacts for them with valuable prospects, gives them an additional profit, and permits faster motor service to impress customers. It also gives them an added pool of skilled men for periodic use in the field.

This firm limits their customers within reason to those who need and appreciate good work, and they take service just as seriously as they do big contracts; for they often find that the former opens the way to big installation and modernization jobs. They don't see how a contractor can refuse to service his own installations regularly without losing goodwill and future opportunities.

Voluntary investigations

The boss thinks one of the best openings for selling sizable remodeling work is to check voluntarily the system of every factory they service, looking for overloaded circuits and places where equipment has been added in a makeshift way. He frequently finds a plant where a low power factor is increasing the cost of current and decreasing production without the management or the plant maintenance man realizing it.

Misguided economy

Some systems are improperly engineered in the first place through misguided economy or lack of knowledge of specific manufacturing needs. In other cases, additions of motors have rendered wiring inadequate; and where too many induction-type motors have been introduced in the same area, there is a certain amount of so-called "wattless" current, which costs money but produces relatively more heat than power. In this case, the contractor can suggest installing a bank of capacitors to increase the real capacity of the circuit up to 50 per cent in some cases.

Improvements pay off

Improvements of this sort will more than pay for themselves in time, and the contractor who takes the time and pains to show the plant managers how to increase production and save money will get their service work from then on. Selling engineering improvements and long-range efficiency is the best kind of service. And there are a lot of patched-up, inefficient or inadequate old systems in industry, business, and even in older homes, which could be modernized if the jobs were intelligently sold and financed, this owner believes.

In summing up the whole service situation, one experienced engineer said: "There are many different contractor set-ups and attitudes on maintenance, but one thing is sure: no matter how little of this work a firm does or thinks they need to do now, it behooves many to take off their mental blinders on the subject and at least fix in their minds the *right way* to handle this operation. No one can be sure what conditions and needs the future will bring, and the industry as a whole has a definite obligation toward all the electrical systems that are installed.

"If all of this maintenance work is not being done well, it's certainly a fertile field for potential research and development. Efficient and reliable service is an important part of the American business tradition, and the electrical industry as a whole neither wants to nor can indefinitely be any exception."

Cultivating repeat residential

By S. W. Ellis

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors ✓
- Industrial Engineers ✓
- Consulting Engineers ✓

◆ REPEAT BUSINESS from home owners is a reliable volume-builder for the electrical contractor who promotes it, believes Delton Houston, of Houston Electric Co., Little Rock, Ark. He demonstrates his conviction with a series of attractive newspaper advertisements on electrical service directed to home owners, three handsome trucks from his five-truck fleet fully equipped to serve residential customers unusually fast, and his own satisfied statement:

"More than 75 per cent of my volume comes from residential wiring and repairs. Older homes must have modernization of wiring to accept the equipment for electrical living that Americans demand today. To illustrate, during the last depression, repairs were about the only volume that the electrical contractor could get. Repairs are still profitable today, when the contractor is set to handle them efficiently."

Behind Mr. Houston's current drive for more volume from home owners is the present "tight" money condition, which has curtailed new construction. Houston maintains that enough profitable volume exists among owners of the older homes to make repairs promotion profitable. He cited air-conditioning as very profitable for the electrical contractor. Most home owners in his area start with one air-conditioner, which always calls for additional wiring. After learning the comfort of air-conditioning and the inadequacy of a one-room unit to cool the entire house, many home-owners buy another unit in a year or two. This addition calls for additional service from the electrician.

Houston also goes after the extra volume to be had from yard lights, post lamps, and lights for patio and terrace. He stresses the cleaning and oiling service he offers for attic and window fans because this gives him contacts that he values.

During early spring, he connects his publicity with the "cleanup, fixup" theme. While homeowners are in the mood for beautifying and modernizing their premises, the electrician can get a share of this good volume, he insists. His newspaper advertisements promote the services he can give for home-improvement, and his electricians are especially urged to keep alert for suggestions to offer customers who have called them for any kind of electrical work.

Houston, knowing that homeowners want prompt service, starts the job the same day he receives a call or has his estimate accepted. His entire service is gauged to speedy service. That planned time-saving starts with the three trucks that spend most of their time in residential sections. These trucks have 90% of the material and tools needed for all jobs, arranged in the compartmented body and on the top. Houston himself checks out the trucks each day, to make sure that all is in order. The trucks are routed to save time, and each is manned by an electrician trained to talk to the customer.

Houston affirms that an electrician dealing with a home owner must be able to deliver a fairly good sales talk, especially when modernization of wiring must be done. This is usually a more or less costly job, and the customer must be made to understand. Without using technical terms that the average layman cannot under-

Delton Houston, owner of the Houston Electric Company in Little Rock, Arkansas, relays emergency repair calls to electricians who keep in frequent touch with him by telephone.

stand, the electrician explains the need of modernization and repairs.

A thorough check is always made before estimates are given, and the electrician tries to make the customer understand that costs will be saved as much as possible. Although Houston does most of the estimating, especially for larger jobs, his men are equipped to estimate when their survey indicates something that needs to be done.

One of the important elements in making residential wiring and repairs profitable to the contractor, according to Houston, is gaining the confidence of the customer.

"Prospects for future business stem from the customer's confidence," he said. "Most of my regular customers do not bother to shop around for estimates. They feel that I will do the work for the lowest price consistent with quality. They feel that way because we try to win confidence from our first contact."

Houston admitted that the unusually attractive appearance of his job trucks have a part in building customer confidence. Shabby trucks are not tolerated. Frequent tradeins for new models are made as needed, both for the sake of appearance and for the economy of operation. The trucks are kept washed and polished, so that no customer need be ashamed of having them parked in his driveways or in front of his residence.

"Good-looking trucks," said Houston, "are particularly important to the electrician who wants to build up a good residential repair volume."

Houston's sticker goes on every job, even the smallest, to remind customers of the contractor who did the work.

Although his newspaper advertisements are specific, describing all services and merchandise promoted, Houston values newspaper advertising especially for the long-time results they create in good will. He does not expect

(Continued on page 122)

Service trucks carry 90 per cent of material and tools needed for all jobs. Delton Houston believes appearance of the company's trucks play a large part in gaining customer confidence.

The need for modernization and repairs must be explained in the layman's language. Modernization is often costly, and electricians are often required to deliver a good sales talk.

Electricians are urged to keep alert for suggestions to offer customers who have called them for any kind of electrical work. Prospects for future business stem from customer confidence.

Installation of high frequency

One of the first high frequency lighting installations was that of the Wakefield Company, for their administrative offices in Vermillion, Ohio. Lamps for the luminous ceiling operate on 400 volts at 840 cycles, secondary distribution.

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors ✔
- Industrial Engineers ✔
- Consulting Engineers ✔

◆ WHEN THE FLUORESCENT lamp was being readied for the market, about 20 years ago, electrical engineers found that the widely standardized 60 cycle 118 volt a-c service left something to be desired for this type of lighting, even though the incandescent lamp had been largely responsible for establishing that cycle standard. In the incandescent lamp, frequencies below 60 cycles cause a loss in the dynamic equilibrium of the filament. But in the fluorescent tube, even at 60 cycles the cathodes are unable to maintain a constant field of ionization, hence there is some loss in lamp efficiency.

Lamp manufacturers, well aware of these facts, have maintained research investigations into the advantages of increased frequencies for fluorescents, and several applications have worked out well. Among them, the Wakefield Company has installed high-frequency lighting for offices in its new administrative quarters at Vermilion, Ohio.

Converting 60 cycles to 840

The 5000 sq. ft. area is lighted entirely by fluorescent lamps, utilizing a luminous ceiling which also provides air diffusion, noise reduction, and sprinklers. The modular grid holds the tops of movable steel and steel-glass partitions. The lighting load is 35 kilowatts.

After investigations of various frequencies up to 3000 cycles the frequency was established arbitrarily at 840. The increase in cost of frequency conversion and possible difficulties in transmission at frequencies higher than that were the deciding factors.

Economics also entered into the decision to use a 30-kva motor generator set for frequency conversion. A static harmonic multiplier would have cost more originally, and the decision was against the electronic type because of high maintenance costs. The maintenance risk of rotating machinery exists also in the motor generator type, but in actual experience over 12 months the equipment has failed only once, due to a faulty bearing in the motor that drives the generator.

The generator is a 400 volt, three-phase, permanent magnet type with the magnet rotor mounted on the shaft of a squirrel cage induction motor. The stator windings and housing are fastened to the motor by a special bell end. The only two wearing parts are the bearings of the 400 volt, three-phase motor, and it is noted above that such bearings can be fallible. Other than these motor bearing contacts, there are no brushes or other contacts to be maintained. No voltage regulator or exciter are required. The dimensions of the generator with motor drive are 18″ x 18″ x 30″.

Since wave shape affects lamp performance, the generator design attempts to create a square current wave through the lamp. Experience has shown that refinements are needed to take full advantage of wave shape. Above 400 cycles, the wave shape influences lamp performance more than a continued increase in frequency.

Each phase of the three-phase generator is carried on a single-phase system. Each is center-tapped and grounded to maintain less than 240 volts to ground.

As to distribution of the 400 volts at 840 cycles, each phase passes through a fused disconnect switch to a distribution panel at one of the load centers. These panels have six circuits. The fuses are cartridge type, with indicator glow lamps.

Distribution and circuiting

No. 6, type TW feeder wires are used, with No. 12, type TW wires in branches. The feeder wires are larger than usual because the influence of the power factor on the generator was under study, which resulted in higher line currents. Switches are 600 volt, two-pole toggle type. They handle up to 50 lamps.

Fluorescent lamps have negative resistance qualities, therefore the current-limiting element must be in a series with each lamp. In the usual brick-type ballast this is an inductance. At about 300 cycles and up, capacitors in series with each lamp become practical. This simplifies lamp circuiting and reduces weight, noise, and heat. Capacitors also allow flexibility in lamp brightness. They increase light output in small areas of this office building by as much as one-third. This was accomplished by a proportional increase in capacitance in order to maintain the same lamp spacing and nearly uniform illumination levels throughout. Those levels can be increased or reduced in any section of the offices by replacing the lightweight low-cost capacitors with those of other values.

There is a capacitor in series with each of the 580 four-foot slimline lamps. If eight-foot lamps had been used it would have been necessary to increase the voltage from 400 to 600 volts to insure quick starting. The lamp and capacitor produce a .20 leading power factor. Power factor correction is by an air core inductance across the line. The correction units are mounted above the electrical channels and located to correct the power factor ahead of the

switch. Each coil corrects 24 lamps to unity power factor. The overall power factor leads about .90 for best operation of the generator.

Under 400 volt operation

In a study of lamp efficiency, sixteen 4-foot slimline lamps were so arranged that they could be powered by the high voltage and frequency or could be switched to a conventional two-lamp ballast at conventional power and frequency. Tests of the light output showed an increase of 13% when under the higher voltage and cycles. This includes the loss in the M-G set which is 84% efficient.

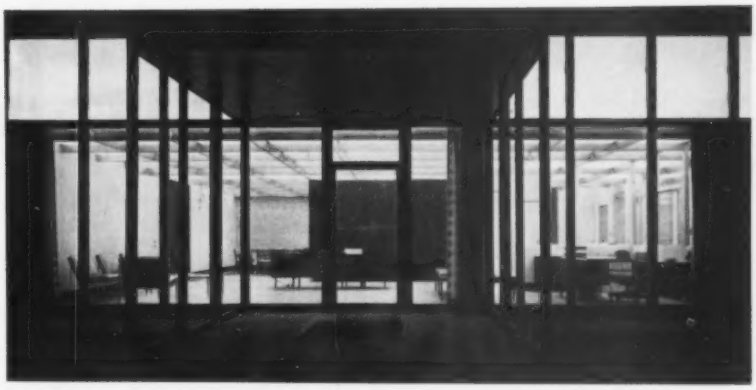
As to cathode ionization, the combination of the frequency and the wave shape brings about a close approximation of complete ionization throughout the cycle. This would indicate that lamp life should increase since the ionization field tends to cushion the shock of the reversing arc, hence should lengthen cathode life. Data on lamp life has not yet been processed. No lamps, capacitors, or switches have required maintenance during the 12 months of operation covered here.

The substitution of capacitors for conventional ballasts has reduced heat output to such an extent that in theory two tons of air conditioning could be eliminated. Originally a 25 ton air conditioning unit was contemplated. Results from the next smaller unit available, 20 tons, have been satisfactory both in cold and mid-summer weather. Statistically, the ballast loss for an instant starting lamp ranges from 10 to 15 watts per lamp, but the loss through the capacitors is only 1½ watts, with the same amount lost in the power factor correction coil. There is a two-fold economy in air conditioning since extra auxiliary heat losses are not brought in, therefore need not be exhausted.

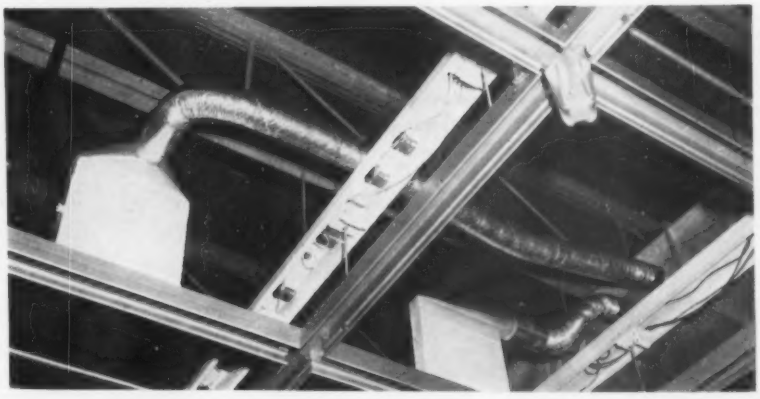
Cost comparisons

The original electrical contract for the Wakefield office building called for 118 volts, 60 cycles for

(Continued on page 124)



Dramatic flexibility of high frequency fluorescent lighting is illustrated in the modular construction of manufacturer's office building.



Details of the installation above include the flexible air ducts, a sprinkler system, and modular grid-work formed by supporting channels.

The modular wall-to-wall lighting system extends throughout the one-story interior, covering an area of nearly 5,000 square feet.

Cooperation links industry

This article contains excerpts from a message presented before the recent annual All-Industry Convention of the Carolinas Chapter of NECA. The cooperation existing between NECA, IAEI, NAED and NEMA is effectively compared to the operation of a railway train.

By Vincent P. Oatis, Jr.
Distributor Sales Manager
National Electric Products Corp.
Pittsburgh, Pa.

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities
- Electrical Wholesalers ✔
- Electrical Inspectors ✔
- Industrial Engineers
- Consulting Engineers

◆ THESE are some of the organizations within our industry, which I believe are contributing to the best interests of all of us, and I would like to point out how closely these associations are interrelated and why this interrelationship must grow and prosper.

The National Electrical Contractors' Association, The National Association of Electrical Distributors, the International Association of Electrical Inspectors and the National Electrical Manufacturers Association are and must be more closely coupled than any two railroad cars that ever ran on any track.

Lets take a look at what happens while the coupling holds and see what would happen if they didn't.

Manufacturer and distributor

To begin with, we at National Electric, like many other forward looking enterprises in the electrical industry, are firmly committed to a manufacturer-distributor relationship. We believe that now and in the future the best and most economic way to make our business grow, and to get our products from the factory to the consumer at lower costs is through the manufacturer-distributor system. We believe that to do this successfully it is the responsibility of the manufacturer to dedicate himself to producing the best possible product at the lowest possible price. To do this is impossible without customer support. The manufacturer's customer today is the distributor and *he always will be!*

Since we believe this to be the case, we have the further obligation to support him in every way possible by doing missionary work and by helping to train his salesmen in our products.

Having committed ourselves to the distributor, we believe that on his side of the bargain he must also commit himself to the manufacturer-distributor team by becoming an integral part of the manufacturer's selling organization and by devoting a percentage of his warehouse space and sales organization time by trade area to the manufacturer's products.

He must decide which of the manufacturers he is willing to support and he must demonstrate this support by stocking their lines, and in this way help build a competitive team which can stand up to the competition of rival distributors.

He must lend his further support by continuing to exploit and promote his manufacturer's lines. We also feel that it is his responsibility, as it is ours, to protect his good name by the products he handles, for the old saying "By the company ye keep, shall ye be known," is as true today as it was a thousand years ago.

Now lets look at this team for a moment and consider whether or not this coupling that we have been talking about must really hold. Of course it must! The distributor knows local credit best. That's his business. He can warehouse better on the local level and service, through selective distribution, and provide continuity of service and quality. That's his business. He can by sheer numbers and local knowledge best build a constructive demand for better living through electrical usage.

The manufacturer and the distributor are an inseparable combination in the American free enterprise system and what is the life blood of one is the life blood of another.

Distributor and contractor

Exactly the same setup exists in the distributor-contractor team, and the bonds between these two are just as strong and just as vital as those that exist between the distributor and the manufacturer. In the same way that the wholesaler adds value to the manufacturer's product by increasing its "availability," the contractor provides "adaptability." He adapts the product to the use the consumer wants to make of it. It is the contractor's responsibility to provide that adaptability as readily as the wholesaler should provide availability. Each compliments the other and each must help the other. This is basically what both have to offer to the manufacturer and the consumer alike.

Now just for a moment, let's take a look at what happens when this coupling breaks down between the manufacturer, distributor, and contractor. Let's say that a manufacturer has salesmen out working to get his brand specified on a

groups

construction job. When the contractor comes to the distributor to buy the specified equipment, he finds that his wholesaler is out of stock. The result is that perhaps the distributor or the contractor tries to make a substitution. Perhaps he succeeds. Perhaps to the consumer it is relatively immaterial because he considers brand B as good as brand A.

Obviously it is not immaterial to the manufacturer of brand A. When his men get his brand specified, he considers that they have made a sale. He is very unhappy to discover that the wholesaler and the contractor, who are supposed to be helping him distribute his products haven't quite succeeded in doing it.

Let's suppose that he investigates a little further and finds that the cause of this unfortunate situation has been the failure of the wholesaler to carry an adequate inventory of his brand. So what happens? Since the manufacturer's problem is to get his products in the hands of the consumer, he puts in a local warehouse stock. Now it is the manufacturer who is creating the availability of his merchandise.

This is a solution, but it is not a good one. If the manufacturer has to do this in many cases it can cost him all kinds of money. The answer is a simple one. The manufacturer, the distributor, and the contractor are a team. This is the way that the American free enterprise system works and always will work and the smart people in the business who are looking to the future and who are not just interested in turning a quick buck today know it and are doing something about it. That's why you find so many of them working in NECA, NAED and NEMA.

Functions of IAEI

But what about the fourth partner in the electrical industry team?

The International Association of Electrical Inspectors, of which I am proud to be a member, contributes an invaluable assistance to all of us; to the industry and to the American people as a whole. Consider for a moment the toll both physically and financially of electrical fires and accidents in our country. In 1953, in Chicago alone, fires caused by electricity were responsible for approximately 12 per cent of our fire losses. This makes our national loss over $100,000,000 to say nothing of the terrible loss of life which must have gone with it. If in this area alone, membership in the IAEI can help to reduce this tragic waste, its operation is of tremendous importance. But the IAEI has many other important duties to perform. Here are just a few of them:

It cooperates in the formulation of standards for safe installation and use of electrical materials, devices, and appliances.

It promotes the uniform understanding and application of the National Electric Code and other electrical codes.

It helps to secure uniform administrative ordinances and inspection methods.

If all of us in the electrical industry are to be successful in our operations, we can only do it by a working knowledge and understanding of the responsibility of the electrical inspector for he is charged with the enforcement of electrical safety measures. This is as important to the manufacturer or the contractor as it is to the average American family. All of us must do what we can to insure mutual understanding and cooperation, not only because of the economics of our industry, but as members of the industrial community which is contributing so much to the growth and welfare of our country.

I hope that I have made clear to you what I believe is the natural and indispensible way in which all of us in the electrical industry, whether manufacturer, distributor, contractor, or inspector must work together to achieve our own individual goals. You may have noticed too, that at times I have mixed the trade associations and the side of the industry which they represent interchangeably. I have done this on purpose and I do it daily in my thinking because I believe that these organizations represent the best people who can be found in each phase of our industry.

What kind of men make up these organizations? They are the business men, large and small, who believe that the future growth of our industry is based on the firm foundation of fair competition and business integrity. They are the contractors in your own community who remain aloof from the hurly-burly competition.

They are the people who somehow always manage to pay their bills on time and therefore do not have to worry about the laxity of the wholesaler's credit policy. They pay their bills promptly because they want to get them off their desks in an efficient manner.

Unlike the fly-by-nights, their businesses continue solvent year after year and they can accurately predict the volume and accordingly can buy the right quantities instead of having to worry about getting a "break" on short ones. Generally, in all phases of the industry these are the people who are successful and contribute most to the welfare and growth of the electrical industry.

Industry projects

Let us take a quick look at some of the projects that these organizations individually and collectively have produced.

Some years ago Captain S. E. Sanislo of the IAEI of Seattle realized that there should be some awareness on the part of the public that while electricity is one of man's greatest servants, it can also be one of his greatest enemies when not properly handled. In 1953 at the time of the Anniversary of the IAEI a resolution was adopted to sponsor a National Electrical Week. In 1954, the program was undertaken and was successful within the limits of the funds available. During the interim period of 1955 and 1956 other associations within our industry became interested and a National Electrical Week Committee was formed. Their plans included a National Electrical Week in 1957 which was observed between February 10th and 16th. It will run annually in the future in observance of Thomas A. Edison's birthday.

As you remember we all worked together toward the success of the promotion on the theme, "Safety through adequacy of wiring installations" and we are all familiar with the great success of our combined endeavors.

Let's just look for a moment at what this kind of successful venture can mean to our industry. Through our joint efforts we have

(Continued on page 126)

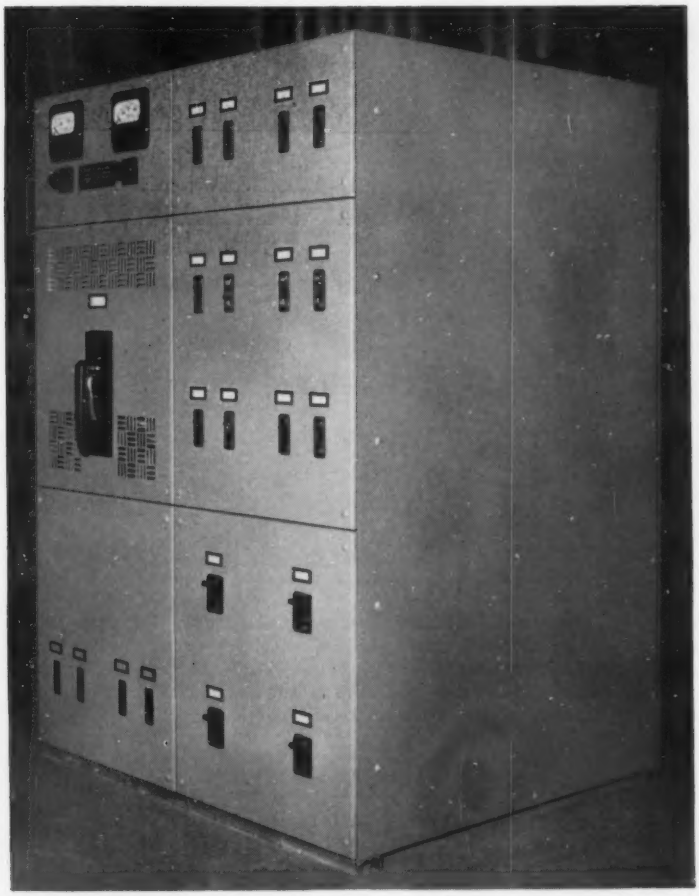
BE MODERN,

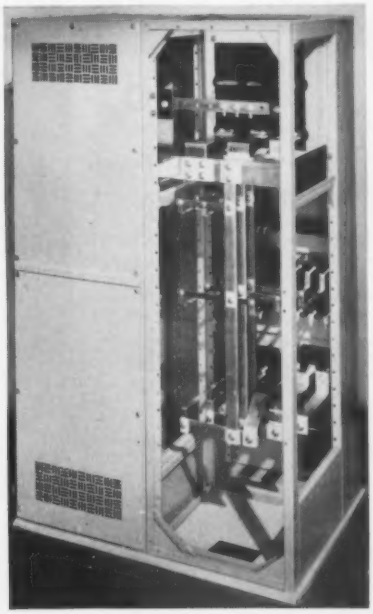
stop "knife throwing" . . .
buy Westinghouse

the new way to insure the most convenient, most flexible and safest centralized control of circuit distribution is with Westinghouse switchboards. Factory wired and assembled to your specifications, a building-type distribution switchboard like the one at right is a cinch for the contractor to install and a pleasure to operate and maintain.

the old way was a "knife-throwing" act in which electrical men worked with open-blade switches and a Chinese puzzle of wires, cables and fuse blocks.

The illusion that clinging to the old systems is economy just because "there's a lot of good years in it yet" is quickly dispelled when you examine the facts. Let a Westinghouse engineer show you what it means to reduce power losses, cut accident and insurance rates, save space and manhours with modern distribution equipment.



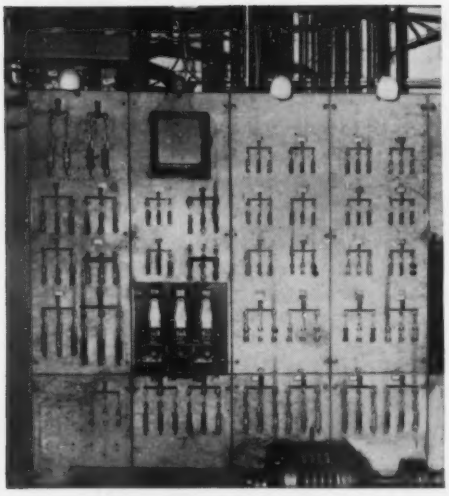


Cross section of switchboard cell showing sectionalized construction, bus bars and supports, convenient access.

At left, a Westinghouse building-type distribution switchboard. Totally enclosed construction, dead front, safe and simple. Protective devices built in.

THE NEW WAY

THE OLD WAY



current literature tells the story of Westinghouse switchboards and how to plan distribution the new way. There are bulletins on panelboard selection, too. Write for your choice today. Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-93538

YOU CAN BE **SURE**... IF IT'S

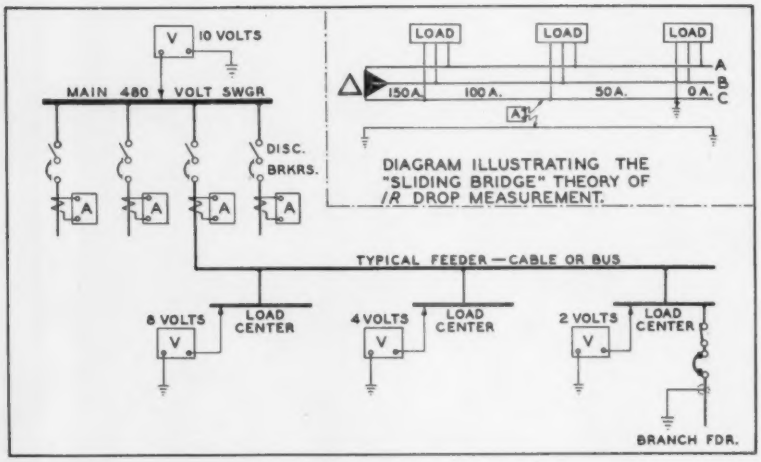
Westinghouse

Locating accidental grounds

By R. I. Betzenhowzer

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers
- Electrical Inspectors ✓
- Industrial Engineers ✓
- Consulting Engineers



Low-range voltmeter is useful in locating grounds on 480-volt delta system. At main switchboard, one and only one line ammeter will swing in unison with low-range voltmeter connected between grounded phase and ground, thus indicating the feeder upon which ground has occurred. Voltmeter is then moved from load center to load center to locate grounded branch feeder.

◆ HERE is a maintenance tip that every industrial plant engineer as well as every industrial electrician will want to clip out and file in his notebook—though it is so simple and useful that such a permanent record should not be necessary. As pointed out, the location of grounds on a large ungrounded electrical distribution system is not easy, and a great deal of time can be spent before they are finally located by the older time-worn methods. With this scheme, however, such grounds can be traced down very quickly with nothing more elaborate than a cheap, low-range voltmeter.

The old method of opening switches momentarily while observing the ground lamps was, and still is, satisfactory on some of our old d-c circuits and the single-phase radial systems. Most new a-c systems are equipped with either oil or heavy duty air circuit breakers and any interruptions, however brief, would, of course, drop all the motors on a feeder as well as other apparatus "locked in" via relay or contactor control.

Searching for a ground in a large mill building covering several acres has been in every respect like searching for the proverbial "needle in the haystack." Often a ground would remain for as long as ten days and automatically disappear when the plant was shut down.

This low-range voltmeter method was suggested in response to a complaint from a substation operator who had a ground of long duration which he was unable to clear even after a thorough check of the entire station. The method was tried with some skepticism on his part and led to an area which he had previously suspected and had, therefore, checked with particular care. But . . . he located the ground fault in a fan motor, the contactor for which had welded in when the fault occurred in the motor. In his earlier investigation, since the fan was not operating, he had assumed that the contactor was open.

How to use this method

The method suggested was essentially this: A voltmeter with a low scale, 0-10 or 0-15 volts, was equipped with a pair of insulated leads (with prods), one of which was connected to ground and the other to the grounded phase of the distribution system. By holding the meter in the hand and standing in front of each feeder panel in turn and watching the low-reading voltmeter, it will be noted that on one —and only one—of these panels the line ammeter and the low-reading voltmeter move in exact unison with load fluctuations, just as though both pointers were on the same pivot.

Since the low-reading voltmeter is actually indicating the IR drop in the grounded cable between the bus and the ground fault, it will fluctuate in unison with line amperes. After a little experience an operator will locate a grounded feeder within a matter of minutes while the plant is in full production. It is obvious, of course, that this method can be used only while the feeder (and branch circuit, if any) is loaded, and therefore subject to IR drop. This is the advantage paramount in its application.

At this point the search for the ground has been narrowed down to one feeder, but the voltmeter can not be brought into play to show within reasonable limits just where the ground is located. By connecting the voltmeter between legitimate ground and the same grounded phase at the load center (or power panel) connected to the feeder nearest the bus, a voltage will be indicated just as at the switchboard, but of smaller magnitude, unless, of course, the ground should happen to be on a local branch circuit. In this event, the voltmeter deflections will be feeble

(Continued on page 124)

All incoming meters are tested, results tabulated on permanent record cards in the Florida Power Corporation Meter Shop.

S. B. Vaughn, Superintendent of Meters, Florida Power Corporation, checks the meter accuracy records in his department.

for impartial proof of watthour meter performance

LOOK TO YOUR OWN RECORDS!

Do you want the real facts about your watthour meters and the kind of service they give? Then check your own company records.

Your metering team—the men on the bench, the metering superintendent, the girls in the record department—are all familiar with Sangamo Meters and their fine performance. We think that you will be surprised, and pleased with the sustained accuracy of the Sangamo Meters on your lines—even after years and years of service.

Sangamo J2 Meters give you straight line accuracy to 100 amperes . . . corrosion-resistant construction . . . high torque, lifetime bearing system . . . high insulation level . . . and *slow disk speed*—five good reasons why the J2 is your best investment in a watthour meter.

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

JM57-6

the man from

Atlanta host to Southern inspectors

◆ A DOUBLE-BARRELLED program of Code discussion is planned for the 29th annual meeting of the Southern Section, International Association of Electrical Inspectors, to be held in Atlanta, Ga., at the Dinkler-Plaza Hotel, October 14-16, 1957. *First*, a maximum amount of program time will be devoted to discussions and explanations of the 1956 Code; *second*, the meeting provides the last opportunity for group discussion of proposed Code changes for the 1959 edition of the National Electrical Code.

The Code Question and Answer periods, under the able leadership of Frank Camus and Ben Segall, have become an important feature of Southern Section meetings, and makes attendance essential for the inspectors, contractors, and others in the electrical industry who require a knowledge of Code rules and regulations.

In addition, the business program will include several speakers on subjects of current interest relating to electrical installations and inspections, reports of Code committees of the Southern Section, reports on International and Chapter activities, and reports on administrative affairs of the Section. Electrical manufacturers will display their newest developments in the Exhibition Hall.

Extensive plans have been made for the entertainment of Section members and their guests. For the men this will include the "Get Acquainted Hour" on Sunday, October 13 at 6:00 p.m., and the annual dinner-dance on Tuesday evening, October 15.

Entertainment for the ladies, in addition to the "Get Acquainted Hour" and the dinner-dance, will include the following:

Monday, Oct. 14: Gray-Line tour of the western portion of the city, with luncheon at Atlanta's famous "Aunt Fanny's Cabin."

Tuesday, Oct. 15: Gray-Line tour of the eastern portion of Atlanta, including Stone Mountain and the Cyclorama, with luncheon at the East Lake Country Club.

Wednesday, Oct. 16: Luncheon and floor show at the Henry Grady Hotel's sparkling "Paradise Room."

A special Hospitality Room in the Dinkler-Plaza Hotel will be maintained for the convenience of the ladies as a lounge and meeting place.

Members and guests planning to attend the meeting should make hotel reservations at the earliest opportunity, addressing them directly to the Dinkler-Plaza Hotel.

Plans for a productive, yet entertaining, annual meeting have been in process for several months. A twelve-man committee, headed by General Chairman Dewey L. Johnson, Supt. of Electrical Affairs, City of Atlanta, has worked diligently to make this the most successful annual meeting in the Section's history.

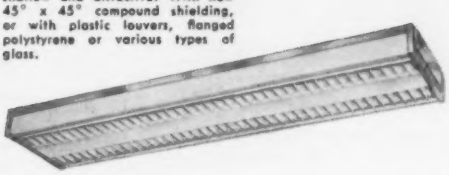
Mr. Johnson's helpers include: treasurer, R. E. L. Shirley; secretary, Cecil T. Jones; finance, Frank H. Benefield and Charles G. Butler; hotel, E. F. (Red) Wise; prizes, Robert B. Alford; registration, H. A. (Sixty) Mason; displays, Clyde W. Palmer; entertainment, Cecil T. Jones; printing, W. E. Sanders; program, Joseph W. Whitner; photographs, Charles G. Butler; and publicity, Carl W. Evans.

* ... the man from Smithcraft

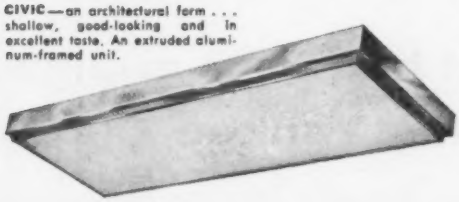
*George Kolbe, manager of Smithcraft's New York City team of Kolbe, Goren and Smith . . . part of the nationwide Smithcraft sales organization.

. . . 4 good NEW ideas in lighting

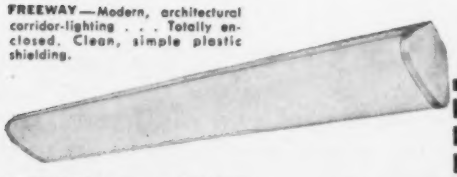
TWOSOME — Top value, low cost, shallow and attractive. With new 45° x 45° compound shielding, or with plastic louvers, flanged polystyrene or various types of glass.



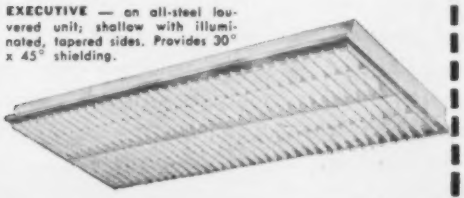
CIVIC — an architectural form . . . shallow, good-looking and in excellent taste. An extruded aluminum-framed unit.



FREEWAY — Modern, architectural corridor-lighting . . . Totally enclosed. Clean, simple plastic shielding.



EXECUTIVE — an all-steel louvered unit; shallow with illuminated, tapered sides. Provides 30° x 45° shielding.



In addition to the TWOSOME and the CIVIC, Smithcraft's new developments include the FREEWAY and the EXECUTIVE. You'll find all four units useful to you in the selling and installing of lighting for today's interiors.

His experience and knowledge of lighting is backed by Smithcraft's highly diversified line of fluorescent units. He can suggest the right fixture to solve a wide variety of lighting problems. On a general office or school lighting job he may suggest the brand new Smithcraft TWOSOME. He may turn to the new Smithcraft CIVIC for offices, banks or any interior where "prestige" lighting is needed. Ask the Man from Smithcraft to show you the 4 GOOD NEW IDEAS IN LIGHTING.

Wherever good lighting is important, you'll find . . .

Smithcraft — "AMERICA'S FINEST FLUORESCENT LIGHTING"

CHELSEA 50, MASSACHUSETTS

PLEASE ATTACH TO YOUR BUSINESS LETTERHEAD and mail to Smithcraft LIGHTING, CHELSEA 50, MASS. ES 9

NAME _____

TITLE _____ CO. _____

ADDRESS _____ CITY _____ STATE _____

☐ Please send me the monthly publication, "Light Side of the News", so that I can keep in touch with the latest trends in lighting.

☐ Please send me folders and catalog sheets on the "4 Good New Ideas in Lighting".

☐ Please send me the complete SMITHCRAFT CATALOG, containing data on America's Finest Fluorescent Equipment.

Newest resort hotel at Fort Lauderdale Beach, Florida, is the Yankee Clipper. This modern structure includes 122 guest rooms, six apartments. SPANG Conduit protects all wiring throughout.

"Spang Conduit's excellent handling qualities made it first choice for the Yankee Clipper

—says Mr. Verne Franke, President, Atlantic Electric Incorporated

Fort Lauderdale Beach's newest hotel, The Yankee Clipper, containing 122 luxurious rooms and six apartments, opened in the summer of 1956.

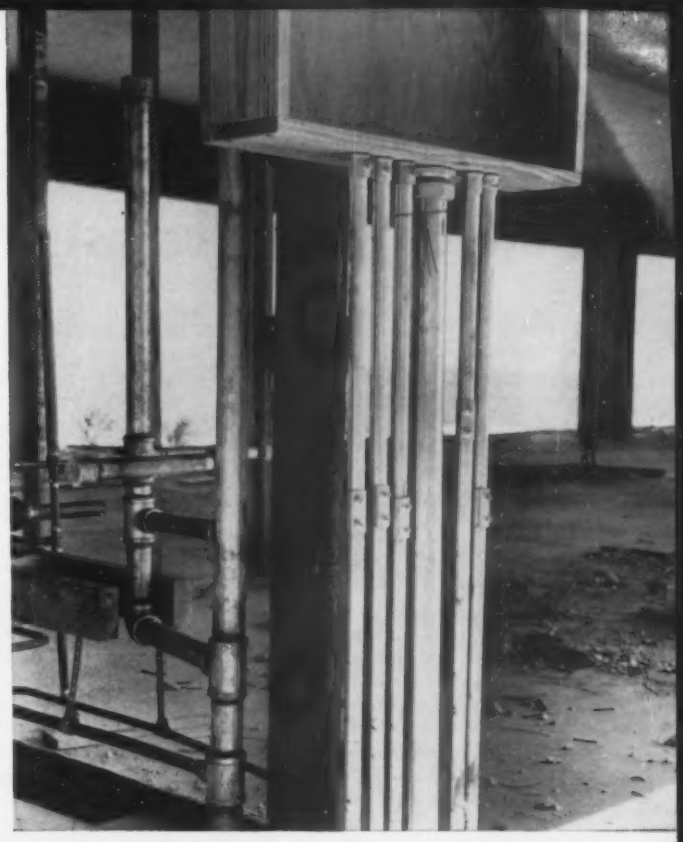
SPANG HD Galvanized Conduit and SPANGLEAM EMT were chosen to protect the wiring through the hotel, reports Mr. Franke, "because of our past experience with their excellent handling qualities and durability in this seacoast town—plus the fine service we have received from SPANG and its local distributor."

ON-THE-JOB REPORT . . . Mr. Monroe Sarvis, project electrician, says this about the Yankee Clipper installation: "SPANG HD Conduit was uniformly easy to bend, cut and thread. I never had to worry about burrs or other inside faults. The hot-dipped galvanized finish never flaked off.

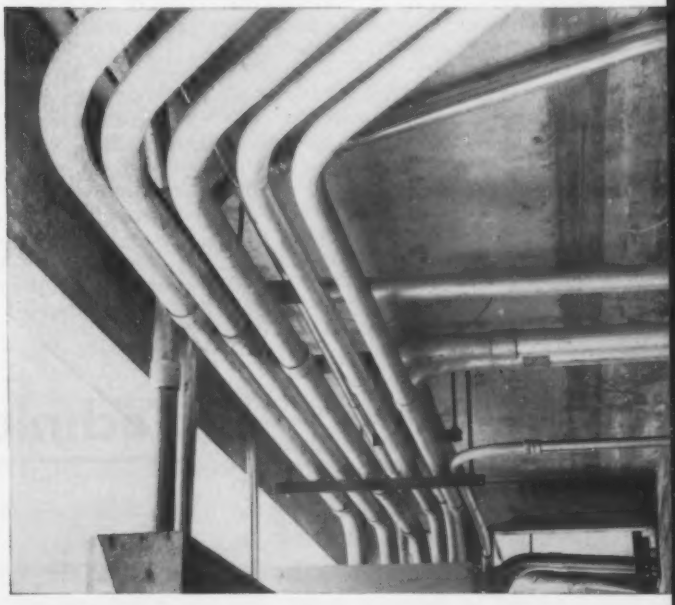
"SPANGLEAM EMT was installed on short runs. We found it was not only easy to bend, but the slick inside finish cut our installation time way down, thereby facilitating a swift and clean job."

Fluorescent Equipment.

Owner and General Contractor—Gill Construction Company, Fort Lauderdale
Architect and Engineers—M. Tony Sherman, Miami
Electrical Contractor—Atlantic Electric Inc., Fort Lauderdale
SPANG Distributor—Service Electric Supply Company, Fort Lauderdale



SPANGLEAM EMT was used on light load-bearing lines. Slick interior finish on SPANGLEAM speeded up job-finishing time.



From past experience, Atlantic Electric Inc., contractors on the job, know that SPANG Conduit provides excellent corrosion resistance from salt air. Electric crews report SPANG HD easy to cut, bend and thread.

and durability installation"

Fort Lauderdale, Florida

LET SPANG HELP YOU . . . You can always count on a *top-quality* installation with *quality-controlled* SPANG HD Conduit and SPANGLEAM EMT . . . because SPANG carefully controls each step in the manufacturing of its conduit, and carefully tests and inspects each lot before shipping to be sure you get a *top-quality* product every time.

Try SPANG on your next job. And you can count on your nearby SPANG Distributor for *top-quality* service, too!

SPANG® CONDUIT

SPANG-CHALFANT
Division of The National Supply Company
GENERAL SALES OFFICE:
TWO GATEWAY CENTER, PITTSBURGH, PA.
District Offices and Sales Representatives in Principal Cities

Thermally actuated device protects F-lamp ballasts

◆ YEARS OF RESEARCH and testing, the Advance Transformer Company reports, has resulted in the development of an internal thermally actuated automatic reclosing protective device for lamp ballasts which is sensitive to temperature and voltage as well as current. Designated by Advance as the "ADVAN-guard," the new device is listed by Underwriters' Laboratories, Inc.

Since the advent of fluorescent lighting, the ballast industry together with the lighting industry have realized the need for an internal protective device which would prevent a fluorescent lamp ballast from operating at abnormal temperatures. It is common knowledge that abnormal temperatures virtually 'rob' the end user of years of ballast life and cause untold headaches and costly manhours for lighting equipment manufacturers, architects, contractors, distributors, the end user and the fluorescent lamp ballast manufacturer.

In the past, individual fusing of each lighting unit was the only method available for providing ballast protection. However, while a fuse will open a circuit in the event of a short within the ballast, it is not possible to utilize a fuse with a current element low enough to render adequate protection in cases other than short circuiting.

A fluorescent lamp ballast performs under two conditions, starting and operating. Consequently, it is necessary to fuse for the higher starting condition. It is therefore possible for a ballast to operate at abnormal temperatures without opening the fused line. An attempt to insert a fuse which is rated close to the line current only results in nuisance trip-outs.

The most common factors contributing to abnormal ballast operating temperatures are incorrect voltage supply, lamp rectification, internal ballast short circuiting, inadequate lamp maintenance and improper fixture application. ADVAN-guard prevents abnormal operating temperatures from these and other causes.

ADVAN-guard, a thermally actuated automatic reclosing protective device, is sealed in the ballast housing and is preset to automatically 'trip-out' whenever the fluorescent lamp ballast operates at abnormal temperatures. When heat decreases to normal operating temperatures, ADVAN-guard resets automatically and the ballast resumes normal operation. If overheating continues, ADVAN-guard protection continues. Through this continuous protection, the full life of the fluorescent lamp ballast will be realized . . . rated life of ballast under normal operating conditions is 10 to 12 years.

Automatic resetting

An important consideration in the development of this protective device was the cycling period, i.e., the time required for the thermally actuated automatic reclosing device to bring the ballast back into operation after it had been taken out of the circuit. It is undesirable to have ADVAN-guard cycle rapidly as annoying flicker would occur. An extremely short cycling period would also contribute to lamp damage and consequent short lamp life. ADVAN-guard, therefore, has a cycling period of 15 to 20 minutes to permit heat dissipation before the ballast resumes normal operation.

Because of tolerance limits inherent in fluorescent lamp ballasts, it is not feasible to provide ADVAN-guard protection which would limit the ballast operating temperature to the exact Underwriters' limits of normal operation at an increase of approximately 10 degrees. This condition will only occur for a short period before ADVAN-guard protection is brought into action.

Permitting operation at this slight increase for a short period prevents nuisance trip-outs and is not detrimental to ballast life.

There are considerable advantages for utilizing these new ballasts in lighting installations even where abnormal operating conditions do not occur. All fluorescent lamp ballasts will eventually fail, due to heat and aging of the insulation or failure of the capacitor. At the end of ballast life, there must be protection against violent failure, and these units provide this protection.

New Underwriters' Laboratories' specifications do not permit the placement of a lighting unit against combustible low-density cellulose fiberboard—unless the unit does not exceed 90° C. under any condition. The phrase "under any condition" means even at the end of ballast life. Underwriters' Laboratories is now considering the fact that the use of a thermally actuated automatic reclosing device which limits the surface temperature of a ballast to 90° C. would meet their requirements. While the present Code does not in itself permit this interpretation, Underwriters' Laboratories is presently investigating this matter, and there is a great possibility that the ADVAN-guard will meet the provisions of the National Electrical Code.

Technical books

for the electrical man

Underground systems

"Underground Systems Reference Book." Published by Edison Electric Institute, 420 Lexington Ave., New York 17, N. Y., 624 pages, illustrated. $12.50 for nonmembers of EEI, $11.50 for members.

This most comprehensive and authoritative treatise on the design, construction, operation and maintenance of power cable systems supersedes the original work of the same name published in 1931 and which is no longer in print.

The 1957 edition of the *Underground Systems Reference Book* is a completely new book. It was in preparation for more than three years by a staff of 134 eminently qualified underground engineering authorities under the direction of the EEI Transmission and Distribution Committee. It was designed

(Continued on page 121)

It takes **KEARNEY QUALITY** in fuse links to give you positive protection... close coordination

FUSE LINKS FIELD-TESTED

Here at KEARNEY's Substation Laboratory of 150,000 KVA Transformer capacity—with a back up power of 445,000 KVA—all equipment is tested under rigorous field conditions. KEARNEY Certified Ratings are not theoretical calculations... but actual, proved performance ratings.

controlled manufacture, rigorous testing provide maximum service continuity

Quality control in KEARNEY Fuse Links starts with design... and continues through careful selection of materials, precision parts manufacture, expert assembly and strictest inspection and testing. The end result is dependable protection... *uniformity* that guarantees all Fuse Links of the same rating will perform exactly alike.

ALL KEARNEY Fuse Links feature low temperature operation. Pure tin elements or low melting point solder, selected for proper strength and melting temperature for each current rating, keep temperatures inside the cutout tube well below charring point. This provides accurate, positive arc clearance even after long periods of overload.

Take care of your requirements in Specialized and Standard Fuse Links with KEARNEY... best you can buy! Contact your KEARNEY Representative.

JAMES R. KEARNEY CORPORATION
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for BETTER CONSTRUCTION
SAFER MAINTENANCE
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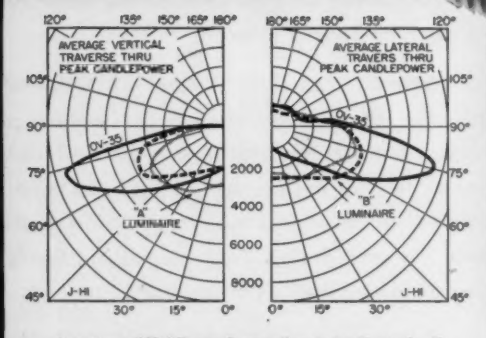
Plants at: ST. LOUIS · FAYETTEVILLE, ARKANSAS · SHENANDOAH & CLARINDA, IOWA — GUELPH, ONTARIO, CANADA

2 to 3 TIMES MORE LIGHT—at

with Westinghouse, Advanced-

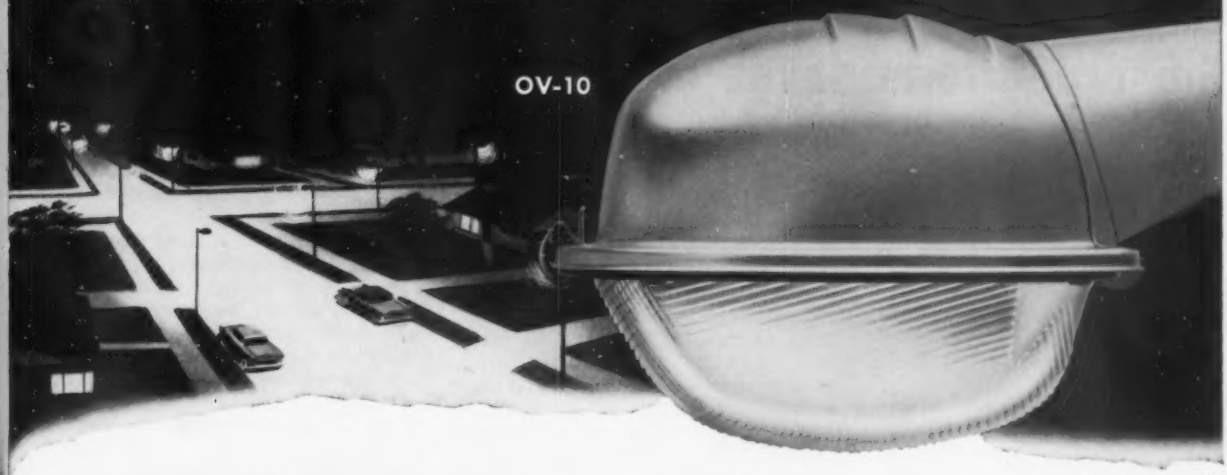
OV-35



See how OV-35 produces "practically twice" the candlepower of luminaires not designed specifically for fluorescent mercury lamps!

OV-35 candlepower curve is from J-H1 400 W color-improved lamp (OV-35 also utilizes B-H17 430W and B-H18 700 W lamps). Note how curves for A and B luminaires (designed *only* for *plain* mercury lamps) show *"practically half" the candlepower* when tested with the *identical lamp employed to produce the OV-35 curve!*

NO APPRECIABLE INCREASED COST!-
type MERCURY LUMINAIRES!



OV-35 **THE ONLY "Mainstreet" Luminaire Engineered and Designed Specifically for color-improved Fluorescent Mercury Lamps!**

"Mainstreet" lighting is now accomplished at *new peaks* of lighting efficiency! Yet at *negligible, if any,* increased operating cost!

This is due to exclusive Westinghouse developments now permitting OV-35 Luminaires to deliver *full* advantage of *color-improved Mercury lamps!*

It's well-known that *mercury* light-sources give up to *three times more light per watt* (than old-fashioned light-sources)! And also *out-last* old-style lamps by as much as *seven times!*

So, now Westinghouse, *alone,* has engineered the OV-35 Luminaire *specifically for* these superior mercury lamps—the OV-35, featuring an *exclusive, sealed* optical system, that *keeps out* bugs and water—and delivers this *greater* illumination, with *unparalleled* efficiency, *directly onto the road-way!*

This OV-35 has a housing of cast aluminum—a special glass refractor of *custom prismatic* design!—a reflector of Alzak Processed drawn aluminum.

Its slip-fitter provides quick, easy mounting and adjustable alignment. Its automatic latch permits fast, "one-hand" maintenance. Yet the seal is *tight* on *special* gaskets! The OV-35 is moisture-*proof* and bug-*proof!* This OV-35 *itself* is accredited for *many* of the advancements in modern "mainstreet" lighting today!

OV-10 **Now Brings the Same, Ideal-type Illumination to Residential Streets!**

The OV-10 has been engineered identically, to complement the famed Mercury Lighting Line of Westinghouse OV Luminaires, *preferred* by *most* street-lighting engineers!

The OV-10 delivers the same "*2-to-3-times-more-light*" and the *same* extraordinary *economy* for the proper lighting levels of *secondary streets!*

The OV-10 utilizes L-H4 100 W, A-H22 175 W and C-H5 250 W lamps. It has, in general, the same marked design and construction superiorities of all Westinghouse street-lighting luminaires. One simple move of the socket gives a choice of light-distribution to suit illumination requirements for virtually *any* secondary street!

All Westinghouse OV Luminaires are available now!

through your near-by Westinghouse Representative, or your own local Westinghouse Distributor! J-04423

WESTINGHOUSE LEADS ALL OTHERS IN THE ENGINEERING, DESIGN AND DEVELOPMENT OF MERCURY ILLUMINATION FOR ALL ROADWAY LIGHTING APPLICATIONS!

YOU CAN BE SURE...IF IT'S

Westinghouse®

OV-20 LUMINAIRE (E-H1 & J-H1 400W; A-H24 & B-H24 430W lamps)

OV-60 LUMINAIRE (A-H18 & B-H18 700W; A-H15 & B-H15 1000W lamps)

Contractors tell how

Job order form saves money

By George B. James
Owner
James Electric Co.
Sedalia, Mo.

◆ OUR JOB ORDER FORM which we have developed over the years saves us considerable paper work by eliminating other forms we once used and reduces material shrinkage by assuring that all material used is charged to the customer or returned to stock.

It also performs two other important services. It becomes a cost record to which we can refer, and, secondly, kept on file for five years as suggested by the government, forms an ideal record of the business, if the government wants to look.

The form is printed on an 8½x11-inch sheet, a standard letterhead size, fitting all filing systems. We now buy them consecutively numbered, so we can charge the job-ticket to the customer's account merely by listing the number, instead of the job. This saves a lot of paper work, too.

The front of the form provides space for writing in the location of job, work to be done, and the customer's name. The first four vertical columns are labor records and provide for date, number of hours worked in morning, number of hours worked in the afternoon, and number of overtime hours. Spaces for totalling the labor hours are at the bottom. This provides some check on the production of the crews, since, if the chargeable hours in mornings and afternoons are not compatible with good business methods, it indicates that men must reach the jobs more quickly and unproductive time reduced.

The next four columns are devoted to recording material, with spaces for quantity, description or name of the material used, and the retail price to be charged the customer. In the next two columns, we put down the net prices after the job has been completed and the customer billed, which gives us a cost record for our files. By checking these cost figures against our overhead percentage, we can tell immediately whether each job makes or loses us money. We can get this information from this form in time to do something about it, as compared with some methods where you never know if you've made a profit until the end of the year or the quarter.

The bottom right corner of the sheet shows total material, total labor, total cost, and taxes.

If we find a current job getting out of hand costwise, we can quickly check back through our files and see what a similar job looks like. Or if we need on-the-job reference in estimating a new job, we can look over these jobs tickets which often provide ideal information of a practical nature.

The reverse side of the form has space for listing all material charged out on the job represented by the ticket. For instance, the crew handling the job can take out all the material they want or need. It is all listed on the back of the ticket as it is checked out to them. When the job has been completed, this material must either be charged to the job or returned to the shop for credit.

Having a record of these transactions on one printed form, not only saves a lot of time, but increases efficiency because it is so easy and natural to make the proper entries. The charging of material reduces shrinkage, too, since most shrinkage is due to the failure to properly charge the lost material.

Again, the form saves time because the man who handles the job has only one sheet to handle. The man who takes the order over the phone or makes the estimate, has only one job ticket to write which, when a job has been completed, provides all information that is needed.

George B. James, owner of James Electrical Co., Sedalia, Mo., has come up with a unique job order form to save time, eliminate material waste.

Manufacturer "tells how"!

FROM John A. McDougall, general sales manager for Revere Electric Manufacturing Co., Chicago, comes this interesting comment on hinged-pole lighting installations:

"I have read with great interest the comments on mercury vapor lighting for service stations in your 'Contractors Tell How' department in a recent issue. The points were well taken and very correct, but our experience leads me to take exception to the statement that break-down or hinged poles should not be used for mercury vapor fixtures because of the weight involved.

"Our company is the originator of the hinged standard, and we take great pride in the strength and performance of our poles. Revere poles are constructed to withstand 100-mph winds. They have been used in many, many installations for a good number of years

Standard-threaded rigid steel conduit is the **only** wiring system approved today by the National Electrical Code as moisture-, vapor-, dust- and explosion-proof for use in hazardous locations and occupancies.

YOUNGSTOWN "BUCKEYE" CONDUIT

. . . gives life-time wiring protection to Zanesville's Good Samaritan Hospital

Good Samaritan Hospital
Zanesville, Ohio

Architect: Dan A. Carmichael, Columbus, Ohio
General Contractor: Knowlton Construction Company, Bellefontaine, Ohio
Electrical Contractor: Electrical Contractors, Inc., Columbus, Ohio

Failure of its all-important electrical system will never interrupt the smooth operation of the Good Samaritan Hospital in Zanesville, Ohio. That's because the builder of this well known institution wisely specified Youngstown's Full Weight Rigid Steel "Buckeye" Conduit for protection of the wiring system from damaging elements such as water, moisture, vapor, dust and dirt.

If the proper functioning of **your** electrical wiring systems—in any location, under any condition—presents a problem, then Youngstown "Buckeye" Conduit should be your specification. Reports from across-the-nation tell us, "It's easier to bend and thread, wire fishing is faster and easier—and its superior corrosion-resistance gives a much longer service life after installation"

Remember, Youngstown is the only producer of rigid steel conduit that controls all its integrated operations from ore mine to finish threading. Thus, you can be sure each length is of the same high quality that has made "Buckeye" Conduit the accepted standard of leading owners, architects and contractors everywhere.

Delivery is no problem—because all leading industrial and electrical distributors carry complete and ample stocks. Why not call today for quick and efficient handling of your current requirements.

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities

with no failures reported on their strength or efficiency.

"We always recommend, however, that transformers be mounted on the lower section of a hinged pole, so that the added weight will not jeopardize the efficiency of the lowering mechanism.

"With reference to the statement that rigid poles eliminate servicing by unskilled personnel, we have found in our experience that floodlights on rigid poles are very often completely neglected, and remain without service of any kind. Therefore, we feel that the hinged pole enables an attendant to lower the fixtures, wash and service them regularly, thereby improving their efficiency and keeping a lighting job at its peak for many years.

"Too, a hinged pole eliminates the risk of climbing ladders, or poles, especially on windy days when the possibility of injury is greatest.

"I feel strongly that the hinged pole is well justified from an economy standpoint in the operation of service stations."

Firemen's inspections promote adequate wiring

By Carl Worsham
Worsham Electric Co.
Knoxville, Tenn.

◆ COOPERATIVE efforts should be made in every town to find electrical hazards and to have licensed electricians remedy them. You can get the voluntary cooperation of people if you go about it in the right way. Much has been accomplished along that line in Knoxville.

Firemen offered to make inspections of homes and buildings to look for fire hazards. They found many people willing and glad to permit inspections.

In East Tennessee we are blessed with good fire regulations and inspectors who know their business. Firemen cooperate. If firemen find an electrical hazard, they notify the electrical inspectors. When the inspector sees bad wiring, he sends a notice to the property owner, and the property owner in turn gets a licensed electrician.

When a fire hazard is pointed out to a property owner, he is usually glad to have needed work done.

In one old downtown building, firemen came across wiring that was completely inadequate for the present day load. The property owner called Worsham Electric for the wiring job. That fire hazard might not have been eliminated if firemen and an inspector had not caught it.

We come across a good many cases like that. Some people don't realize the danger in bad wiring and an educational campaign is important. Knoxville newspapers gave publicity to the offer of firemen to make inspections, and that helped.

People add to the electrical load without thinking of the danger. Some don't realize that every Tom, Dick and Harry is not a licensed electrician. That has to be pointed out to many property owners.

We try to tell them that if an electrical job is to be done, it should be done by a good licensed electrician. New home builders are urged to have a good electrician too—that is not always the cheapest, but it is pointed out that the builder is sure of getting the best job.

We call attention whenever possible to the hazard of overloading the meter center and main line switch with added appliances. We encourage separate circuits for each heavy appliance. Many small heaters are sold by stores which tell the customer to just plug them in, and generally the customer doesn't think of a possible overload. The heaters sometimes take more current than is realized.

Carl Worsham, of Worsham Electric Co., Knoxville, displays some of the hazardous old wiring uncovered by voluntary inspections by firemen.

Tennessee has a rigid law on rest homes and they're being inspected a lot in East Tennessee now. These include homes for the aged. There is rigid inspection on beauty shops too.

Dishwashers and garbage disposals should be on a separate circuit with a fuse switch. A lot of people just tie those appliances in any way. All electric water heaters should have a fuse switch at the heater, so it could be cut off if necessary. They're supposed to have safety valves on them, too, but sometimes they don't work.

Contractor wins lighting award

◆ A UNIQUE and colorful lighting job performed by Sarasota contractor Si Bell, president and owner of Sarasota Electric Corporation, has brought Bell wide recognition and won a state contest for him.

Bell had been faced with a formidable task when asked by owners of the plush Colony Beach enterprise here, to devise an original lighting system for the new resort. After three months of painstaking experiment with palm fronds, sea shells, metal fabricated stars, various sizes and styles of

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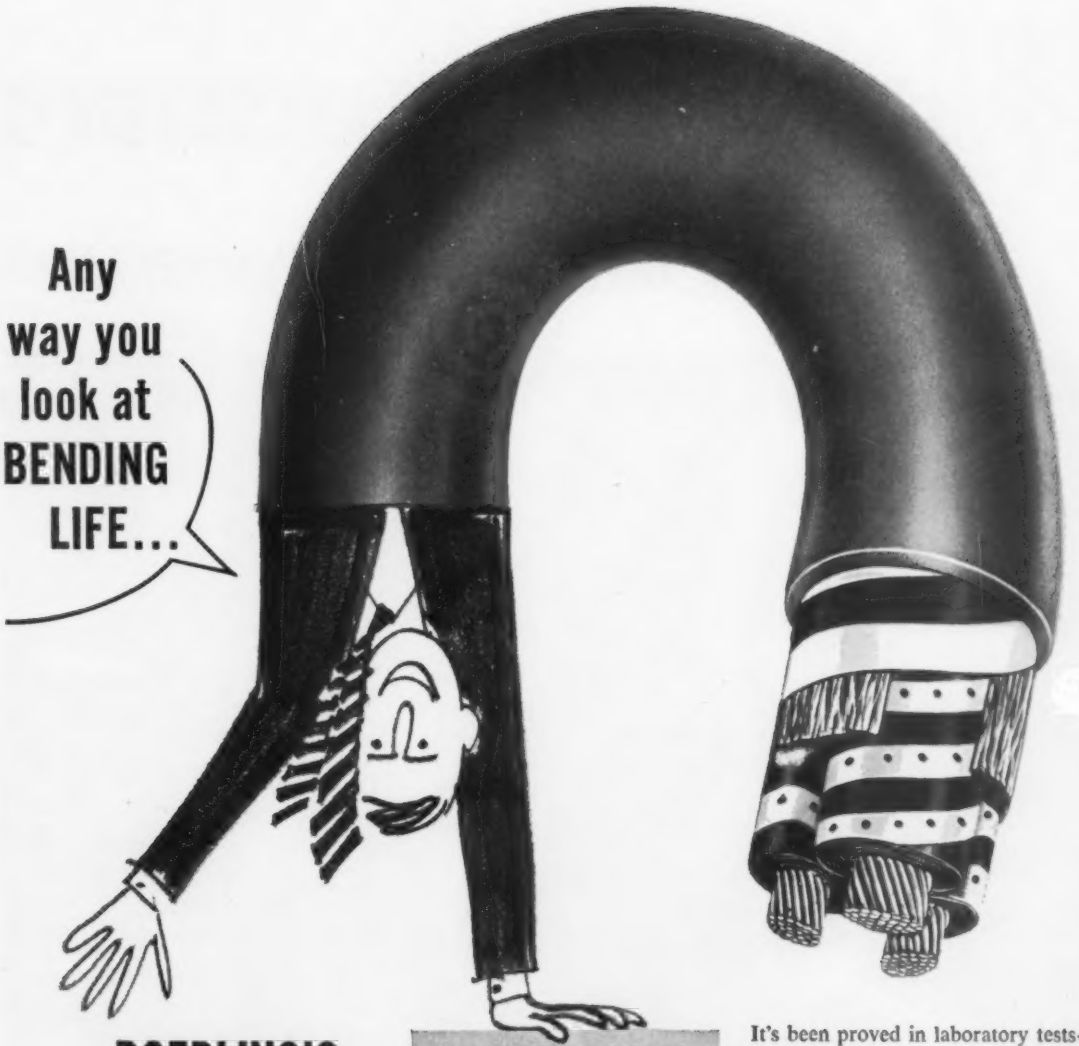
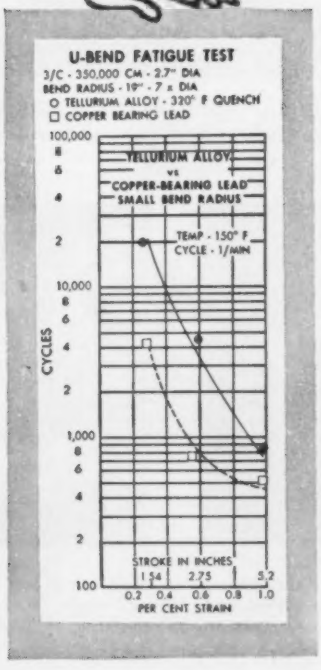


ROEBLING'S TELLURIUM LEAD ALLOY SHEATH LASTS 4½ TIMES AS LONG!



It's been proved in laboratory tests—the Tellurium Lead Alloy Sheath on Roebling Paper Power Cable has *4½ times more bending life* than copper bearing lead sheath! What's more, tests (and experience) prove this sheath has outstanding stability under heat... unusual resistance to age hardening... negligible creep rate at 200 psi, 150°F

The paper power cable inside matches the extra quality of the sheath. And that's the whole story—there's simply no better cable buy, when the cable you use has to last, then last some more!

Test data and an informative folder about the exceptional properties of this sheath are available. Write: Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

Roebling electrical wires and cables are available with either copper or aluminum conductors.

MAINLINER LUMINAIRES

FOR 1 WIDEST VARIETY 2 "TOP" APPEARANCE

Lighting that *often* increases retail departmental sales as much as 300% is provided by Mainliner Luminaires, and featured *throughout* all departments of the great new Montgomery Ward store located at Portsmouth, Ohio.

Mainliner Luminaires, all, are simple to mount in continuous rows. Fixtures, as shown here, are merely butted, and then bolted together through the abundant knockouts. No connectors are necessary. These are Tee-Bar units.

Mainliner special reinforcement makes handling "firm" and easy. Dimensional correctness keeps installations perfectly "square," with no need for "readjustment!" 4'x 4' units, here, rest on Tee-Bars, need no added support!

SELECTED BY MONTGOMERY WARD

3 SPEED—EASE OF INSTALLATION!

Mainliners—the industry's newest and most advanced luminaires—by Westinghouse—in more and more cases are proving first choice of architects, lighting engineers and contractors alike!

Their specification of Mainliners, they say, is due to Mainliner superiority on three specific counts: (1) Widest selection available in the industry! (2) Highest quality appearance! (3) Engineering, design and construction that *save installation costs three ways!*

Mainliner Widest Variety! 4 mounting types, 6 basic sizes and 13 shielding styles fulfill *any* large-area lighting requirement!—permit more than 1000 *all different* combinations! Modular proportions and *dimensionally correct* construction, of Mainliner Luminaires, "mate" with any type of "squared" ceiling material!

Highest Quality Appearance: Mainliner door-frames have *mitered* corners! Latches are flush, almost indiscernible. The extremely "shallow" design of Mainliner units gives a "patterned" rather than a "boxy" appearance, when they are surface-mounted. And, a black stripe applied to the light-trap seat—*eliminates* the escape of light from around the door-frames of Mainliner Luminaires!

Save Installation Costs 3 Ways! Rugged and reinforced Mainliner construction eliminates "crimping" and "wobbling"—for *much* easier handling! Mainliners come *completely pre-assembled!* Doors are packed separately. Cartons simply "rip" open. Mainliners cut *all* job-planning—job-layout—and luminaire-handling time!

Mainliners are only 4⅞" deep! Easiest ever to position and mount! Recessed models include Flange-type, Grid-type and Snap-in Tee-Bar units. Surface-mounted units permit a semi-recessed appearance.

Mainliner doors, too, come pre-assembled—hinge and latch from either side. And, the *complete pre-wiring* of Mainliner Luminaires is *consistently* reported to *cut wiring-time in half!*

Get *all three* superior advantages of Mainliner Luminaires—through your near-by Westinghouse Representative—or through your own, local Westinghouse Distributor! J-04426

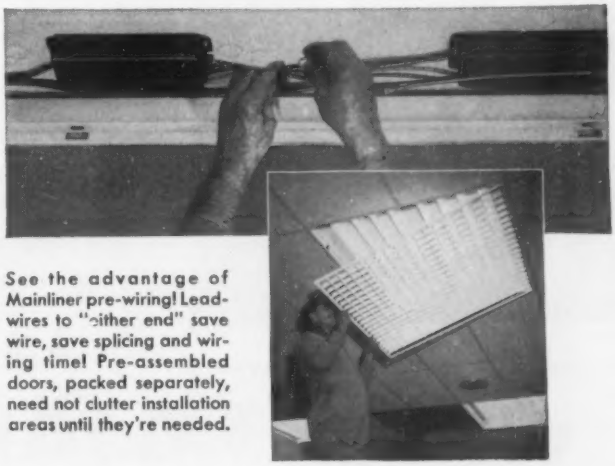
LIGHTING SALES CLINIC — Certified Lighting

Request a Mainliner presentation today!

YOU CAN BE SURE...IF IT'S

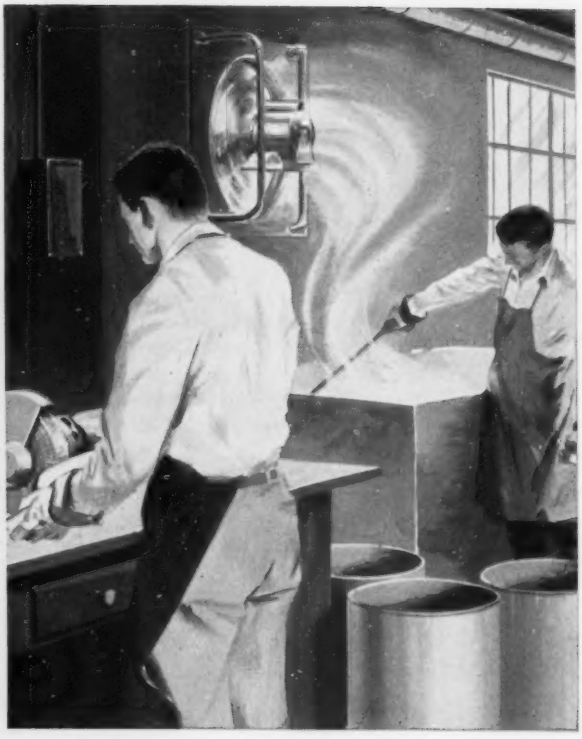
Westinghouse

See how easily various models from the wide variety of Mainliner Luminaires are applied for both functional and decorative lighting, as *well as* for "Merchandising" lighting, at the new Montgomery Ward store in Portsmouth.

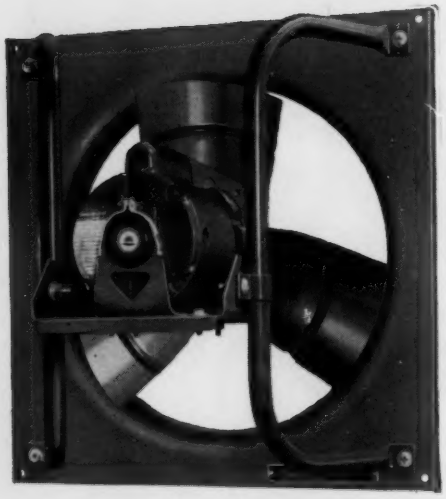


See the advantage of Mainliner pre-wiring! Lead-wires to "either end" save wire, save splicing and wiring time! Pre-assembled doors, packed separately, need not clutter installation areas until they're needed.

FROM OFFICE . . . TO FACTORY



. . . bad air vanishes with Ventura Fans



American Blower Model K Ventura Fan

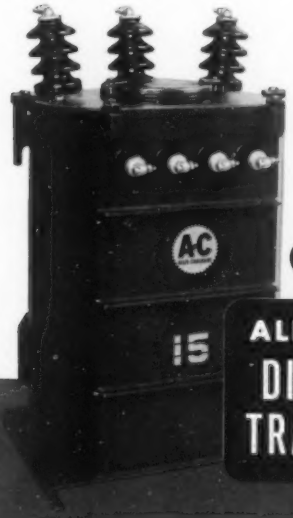
Whisk away stale air with an American Blower Ventura Fan —the popular choice for all types of commercial and industrial applications, from cafeterias, laundries, offices to salesrooms, warehouses, factories.

American Blower engineering experience is behind every Ventura Fan. Balanced ventilation, quiet operation, functional streamline design ensure you of top operating efficiency for many years.

For information on the complete line of American Blower Ventura Fans, call or write our nearest branch office. American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER

Division of American-Standard



New Three-Phase
Curvacore Transformer

CUTS Changeout COSTS

ALLIS-CHALMERS
DISTRIBUTION
TRANSFORMERS

ALLIS-CHALMERS

ELECTRICAL ENCLOSURES

STEEL or
ALUMINUM

New Three-Phase *Curvacore* Transformer

CUTS Changeout COSTS

ALLIS-CHALMERS
DISTRIBUTION
TRANSFORMERS

ALLIS-CHALMERS

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ALLIS-CHALMERS

ELECTRICAL ENCLOSURES

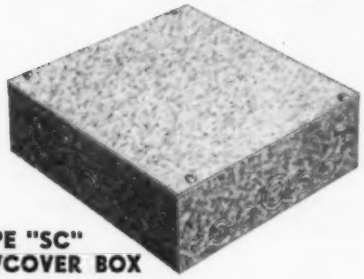
STEEL or ALUMINUM

Contractors, Industrials, Utilities, Municipalities, REA's

CABINETS AND BOXES

TYPE "PF" TELEPHONE CABINET

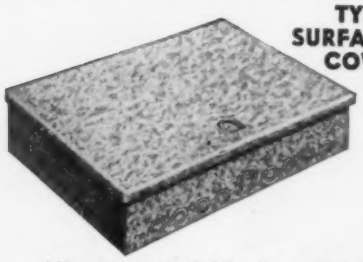
Surface or Flush Mountings in either galvanized or grey enamel finish. Constructed from the finest steels available, all in compliance with the Underwriters Laboratories specifications.



TYPE "SC" SCREWCOVER BOX

Durable Formed Construction, galvanized or grey enamel finish, with or without knockouts. Sizes to your specifications.

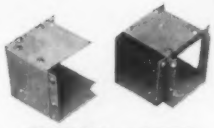
TYPE "A" SURFACE HINGE COVER BOX



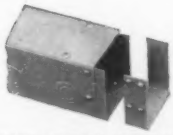
All sizes available for electrical cutouts, switches, relays, junction and pull box applications, galvanized or grey—with or without knockouts.

WIREWAYS and DUCT

TYPE "SD" SCREW COVER AUXILIARY GUTTERS



ELBOW and TEE



"U" CONNECTOR

END CAPS

For Switches, Panel Boards or Straight Runs, you can't match the flexibility, greater capacity and easy installation of B&C wireways. Die formed construction of heavy gauge sheet steel, as specified by the Underwriters Laboratories and the National Electrical Code.

HINGED COVER WIREWAYS

TYPE "HCW"
$2\frac{1}{2} \times 2\frac{1}{2}$, 4 x 4, 6 x 6
1 to 5 foot lengths

ALL ASSOCIATED FITTINGS AVAILABLE
Steel Protection of Electric Conductors, plus Accessibility.

Economical to install and maintain — tapping, splicing, additions, inspections, may all be made within the limitations of the National Electrical Code.

Write for descriptive catalog containing installation data and current price list.

Your Seal of Dependability and Safety

B and C METAL STAMPING COMPANY

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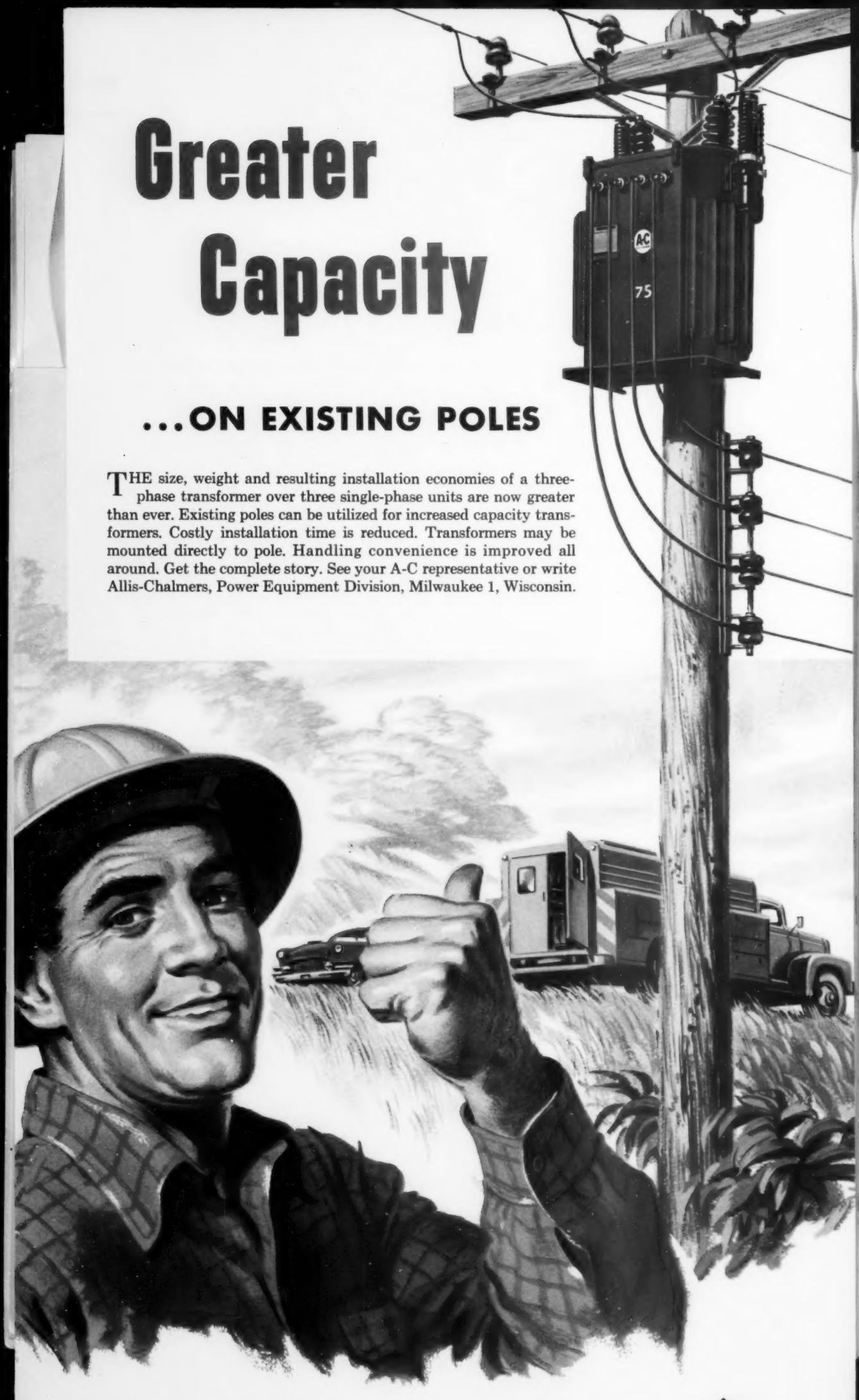
Greater Capacity

...ON EXISTING POLES

THE size, weight and resulting installation economies of a three-phase transformer over three single-phase units are now greater than ever. Existing poles can be utilized for increased capacity transformers. Costly installation time is reduced. Transformers may be mounted directly to pole. Handling convenience is improved all around. Get the complete story. See your A-C representative or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.



ALLIS-CHALMERS

A-C ALLIS-CHALMERS

ELECTRICAL ENCLOSURES

STEEL or ALUMINUM

Contractors, Industrials, Utilities, Municipalities, REA's

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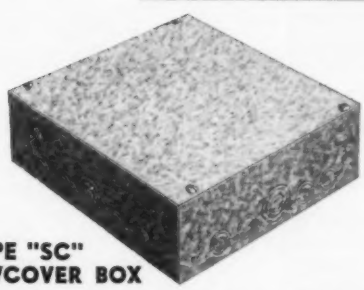

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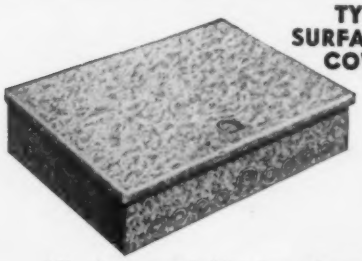

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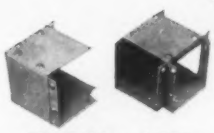

ELBOW and TEE

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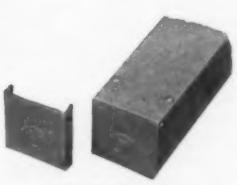

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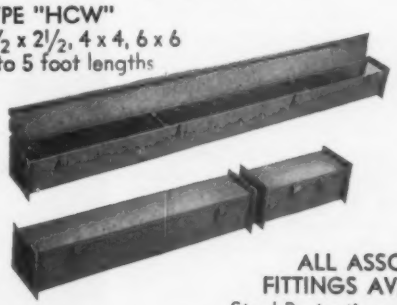

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METAL STAMPING COMPANY

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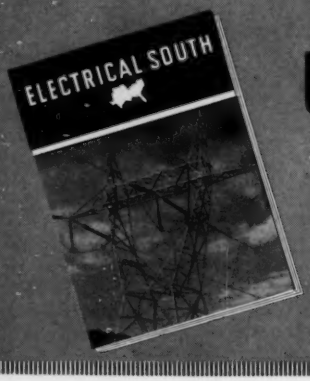


Utility Engineers' Forum

Design
Installation
Testing
Maintenance

Data file coordinates shop and routine meter tests

By Nick Newton

Division Meter Superintendent
Arkansas Power and Light Co.
Harrison, Arkansas

◆ ROUTINE, OR PERIODIC, meter testing is haphazard in procedure at its best. As is generally practiced, on a geographic basis, it involves many tests that are unnecessary because meters are changed from time to time by servicemen for one reason or another, and the recently changed meters are tested along with the others when a test crew enters the area to test out.

As time goes by, and the number of connected meters increases, meter department supervisors are becoming more and more aware that something must be done, not only to keep abreast of the prescribed test schedules, but also to eliminate the needless testing of recently installed meters.

Some companies employ men who do nothing else but test residential and small commercial meters, and their work is never done because by the time they have gone completely over the property it is time to start over again in order to stay on schedule.

The meter department, in the Ozark Division of the Arkansas Power and Light Company, has recently installed a program, on a trial basis, whereby both these problems possibly will be solved. Every meter involved in routine test work will have a record of a shop test in accordance with test schedules. The idea involved is not new, per se, but the fact that it is apparently succeeding, places it in a novel position, and as often happens, it evolved from necessity.

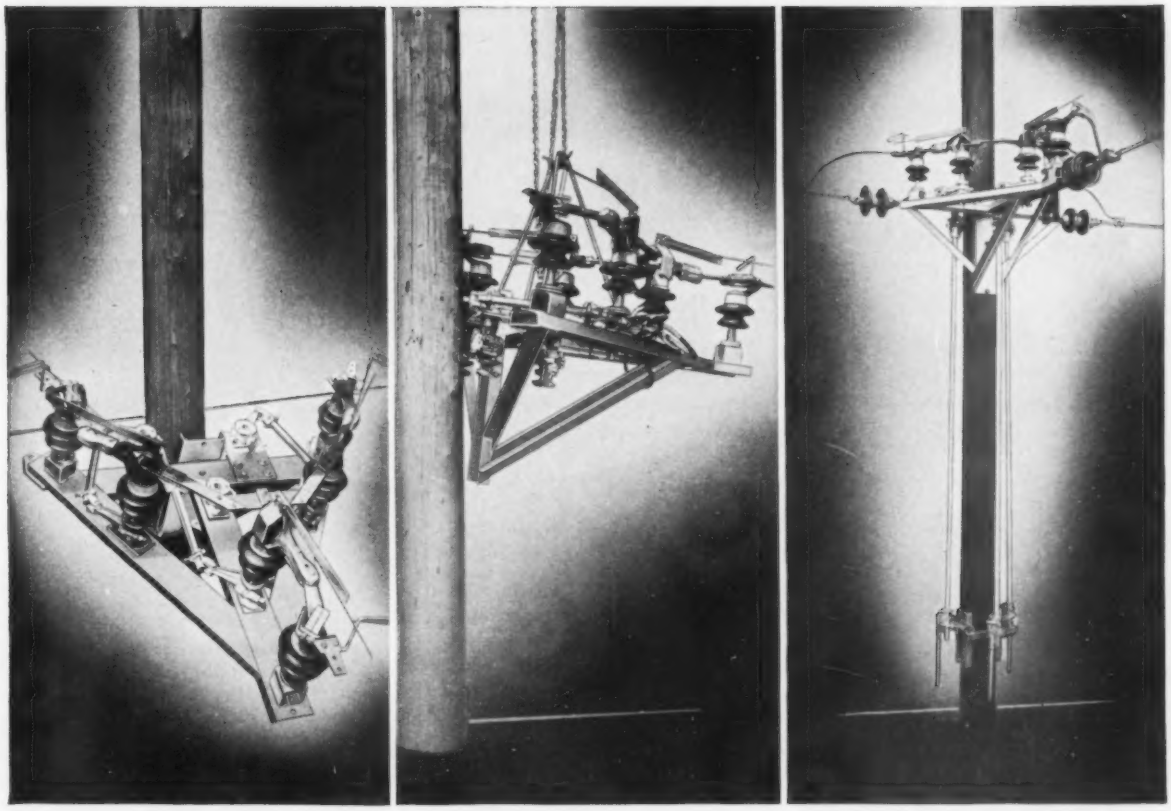
Large area covered

This being a small division with respect to the number of connected meters, but relatively large in area to be covered, it became increasingly apparent in recent years that the small number of meter testers employed, and the transportation available, could not handle the outside tests necessary in the prescribed time, and still maintain shop tests, maintenance, and other outside work.

Inquiry revealed that the local managers of the various towns of the division were ready and willing to cooperate with the meter department by having servicemen change-out meters due tests, if some method of procedure could be worked out whereby they could know which meters to change. This willingness to cooperate has played the main role in the success of the program, which now seems to be apparent.

(Continued on page 82)

Nick Newton checks cards representing each meter in the Ozark Division of Arkansas Power and Light Company—part of new test plan.



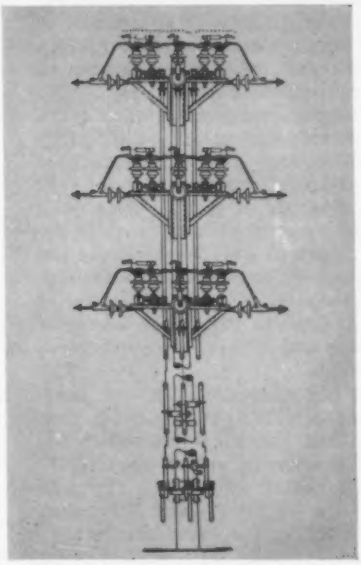
Expansion problems solved quickly with DELTA-STAR Type TH Pole Top Switches

Does time sometimes run short on your expansion projects? Is ground space sometimes at a premium? If you have these or similar problems, you may readily solve them with the installation of Delta-Star Type TH Pole Top Switches.

Installation of Type TH Switches is quick and easy because the switches, bases and frames are mounted as an integral unit. There are no separate units to install. Each switch has a simplified, independent operating mechanism, permitting 3-phase operation from ground level.

Quick-whip arc suppressors eliminate heavy arcing during interruption of line and transformer charging current up to 15 amperes. Standard open gap spacings meet or exceed AIEE and NEMA guarantees.

Type TH Switches can be installed at less than ¾ the cost of conventionally-mounted air switches. It will pay you to check into them soon. Call your nearby Delta-Star representative.



Type TH Pole Top Switches may be obtained for 2-way or 3-way switching, in 400 and 600 ampere ratings, and 7.2 to 69 kv. For complete data, write for Bulletin T-5511.

H. K. PORTER COMPANY, INC.

DELTA-STAR ELECTRIC DIVISION

Divisions of H. K. Porter Company, Inc.: Cleveland, Connors Steel, Delta-Star Electric, Henry Disston, Leschen Wire Rope, Quaker Rubber, Refractories, Riverside-Alloy Metal, Vulcan Crucible Steel, W-S Fittings, and H. K. Porter Company (Canada) Ltd.

A gang test board for single phase meters

Small capital outlay and considerable savings in operating expense are advantages claimed for this gang test board. Meters are brought into shop for periodic testing and get much additional maintenance that it would not be practical to duplicate in the field.

By R. C. Ashe
Supervisor, Meter Laboratory
Georgia Power Company
Atlanta, Ga.

◆ THE METER manufacturers and utility meter departments have in the past few years developed many methods for improvement in testing of single-phase meters. These methods range from the development of a microswitch for use on conventional test equipment to the highly electronic and superbly engineered calibration equipment of one manufacturer.

The requirements of meter manufacturers and utilities for testing facilities vary greatly inasmuch as the former requires a relatively few number of test or runs on a great quantity of meters while the latter having only a fraction of the number of meters of the former, yet requires a greater variety of tests due to different sizes of meters and different manufacturer products.

In the single-phase meter, however, the utility can save a considerable amount of money in operating expense and at a relatively small outlay of capital expenditure by adopting gang testing as practiced by the manufacturers.

The testing of single-phase meters is relatively simple and can be done routinely with very little effort through gang testing. The number of meters that can be tested in this manner depends directly on the number of tests and the length of each test.

Choosing test positions

The data recording can be performed while the meters are under test. Therefore, the number of test positions must be chosen to efficiently balance the time or duration of the tests to the length of time required for recording the test data. As an example, a manufacturer, who records no data, might choose to gang test 40 meters at a time while a utility, who must keep test records, would choose a much smaller number because otherwise the test equipment would be idle while much of the data was being recorded.

The meter laboratory of the Georgia Power Company has constructed a number of gang test tables which test six meters at a time and which contain a number of features and improvements that are not to be found on similar equipment on the market.

Rotating standards used

The principal innovation on this board is the direct use of a rotating standard instead of the obsolete "slave meter" method for calibration purposes. This provides a greater degree of accuracy together with the natural integration of the standard into the regular rotating standard test schedule.

For the greatest accuracy as well as speed and efficiency, a photoelectric pickup and counter is used to cut the meters on and off after a predetermined number of revolutions of the rotating standard. In most cases, the pickup will detect the shadow of the black hand of the standard as the latter passes but many times a mirror must be placed on the standard dial and this will provide a greater contrast and therefore greater sensitivity. The use of the photoelectric pickup makes repeat runs unnecessary inasmuch as its error is small and consistent.

The potential for each meter and the rotating standard is provided by a Knopp precision potential transformer with one primary and seven secondaries. By having a separate secondary for each meter then all possibilities for feedback through the series current circuit are eliminated.

In controlling the primary source, therefore, all meters are started and stopped uniformly with a relatively small relay and the photoelectric equipment. A like result could be obtained by controlling the current but here a large relay would have to be used which would handle the highest current available and would be subject to arcing and burning.

The current circuit is a series circuit which can be switched easily by the 2W/3W selection switch from two wire to three wire meters. Phantom loading is used with fixed resistors employed for calibration at current levels.

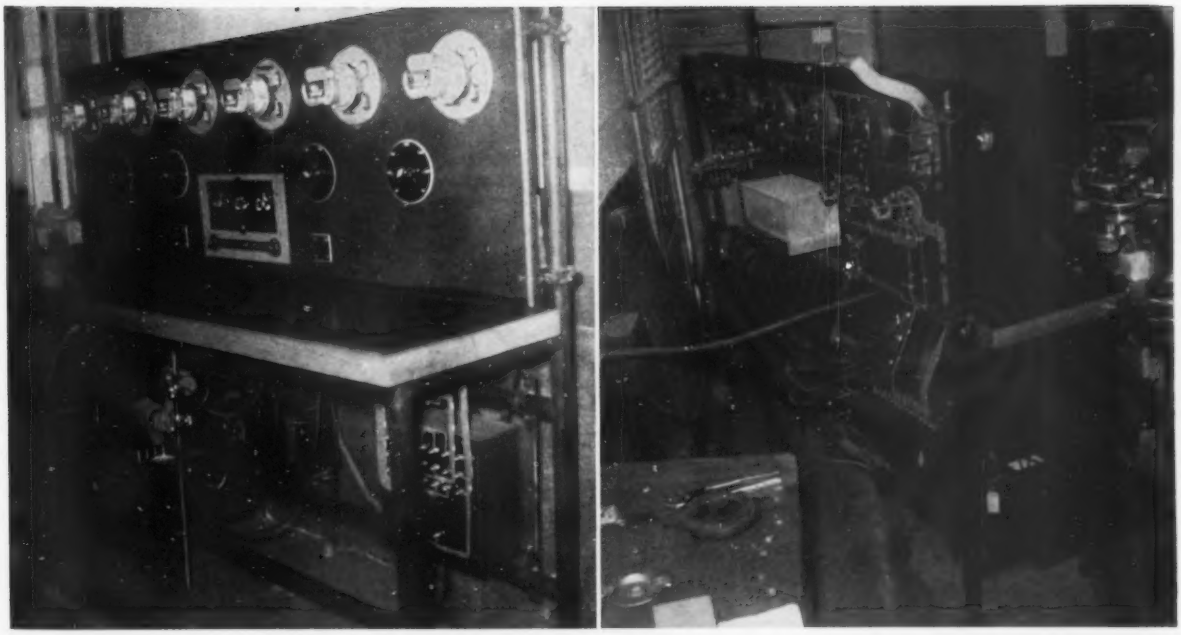
It is not necessary on this board, as is required on polyphase gang boards, to have Variac control because six single-phase meters drop the current only slightly from the setup where only one meter is being tested.

Current selection switches

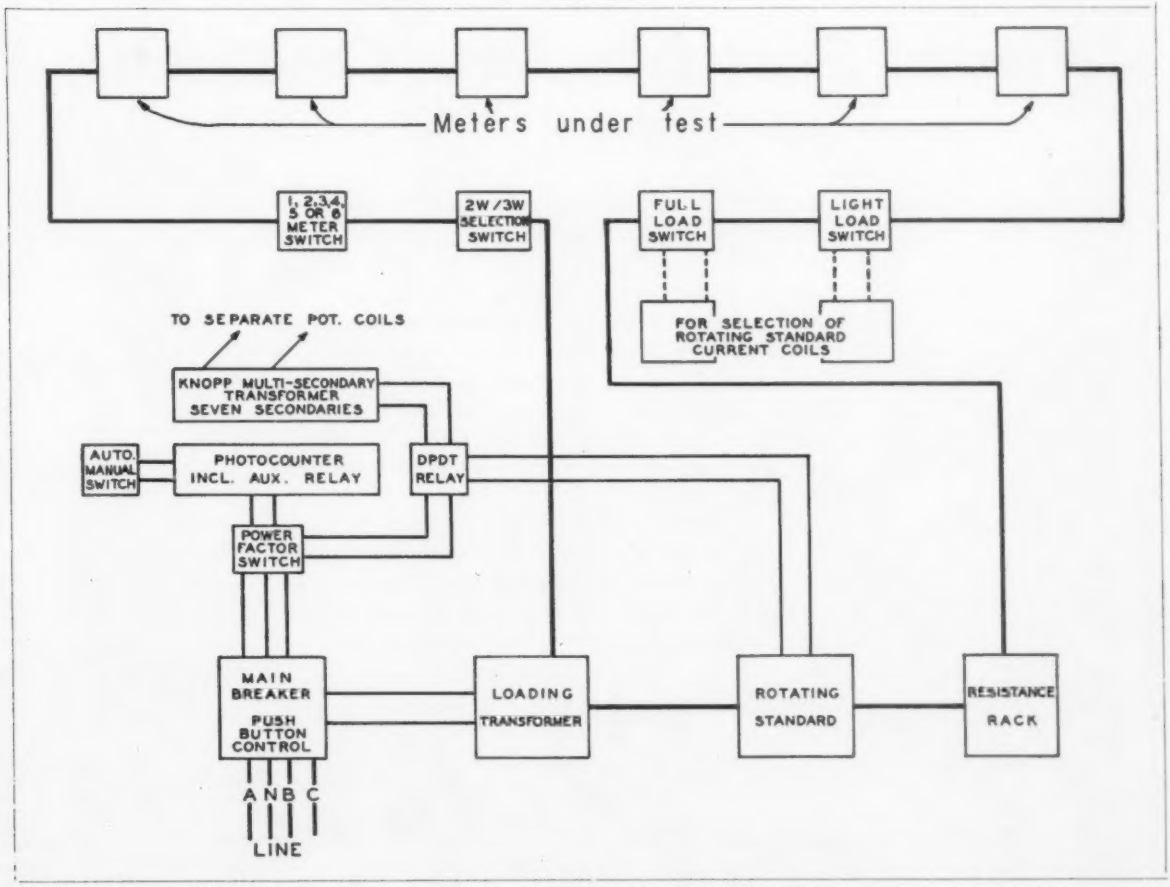
An important feature of this board which is of much use where only small numbers of meters are being tested is the addition of a current circuit selection switch which will permit the testing of one, two, three, four, five, or six meters without having to short out the vacant sockets. The current values are selected by two current selection switches which combine this primary function with the additional duty of selection of the proper current winding on the rotating standard.

The above four switches are Eastern Specialty switches which are rated at 50 amperes and which are provided with a microswitch to break the current load by breaking

(Continued on page 80)



Front and rear view of one of Georgia Power Company's single-phase meter gang test tables.



Block diagram of the various components incorporated in the single-phase gang test board.

PREFORMED ARMOR-GRIP SUSPENSION UNITS provide a
Pretty Soft Life for a Conductor
. . . cradled in durable neoprene
No vibration fatigue here. The Preformed Armor-Grip Suspension Unit (AGSU) eliminates failure by eliminating stress concentration.
The conductor is cushioned in a split neoprene core, held securely by Preformed rods that never lose their tight grip, and supported in an aluminum housing. Conductor is protected and longitudinal stresses are distributed through the entire length of the rods—not at one point.
Like other Preformed line accessories, the AGSU obsoletes bolted hardware. It's easier to apply (no tools needed), costs less, does a better job. You get mechanical strength and electrical protection, and—because of the smooth contour and large diameter of the rod ends—corona emission and radio influence are minimized.
Want to know more about the Preformed Armor-Grip Suspension Unit —or see the application demonstrated? Write PREFORMED LINE PRODUCTS COMPANY, 5349 St. Clair Avenue, Cleveland 3, Ohio. Cable Address: Preformed-Cleveland . . . in 10 years the leading manufacturer of armor rods, dead ends, Guy-Grip dead-ends and other line accessories.
PLP
You can look up to Preformed
Made in accordance with or for use under one or more of the following U. S. Patents: 2,722,593; 2,775,019; 2,587,521; 2,609,653; 2,691,865; other patents pending.

Save 10¢ OR MORE

on every Factory Assembled Set-Up Box you install with . . .

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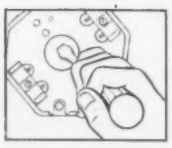
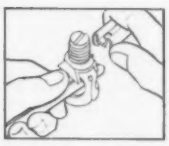
SET-UP BOXES on Adjustable and Solid bar hangers

Assembled . . . Ready For The Job!

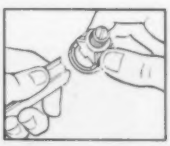
AVOID THESE COSTLY STEPS ON THE JOB BY USING RACO SET-UP BOXES!



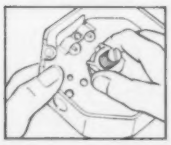
1 Remove center KO in bottom



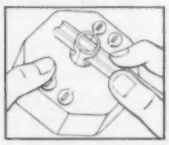
2 Loosen stud set-screw and separate bars



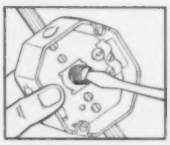
3 Remove stud assembly



4 Position stud assembly in center KO of box

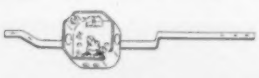


5 Insert female bar section through saddle and assemble both sections of bar



6 Tighten stud set-screw

It costs you 12¢ at average labor rates, to have your men assemble a box on a bar. You can buy the same box and bar factory assembled for an assembly charge of about 2¢. You save 10¢ on every set-up box you install . . . a substantial dollar savings to add to your profits.



YOU CAN'T ASSEMBLE FOR 2¢! TRY IT!

ASE RACO

ALL-STEEL EQUIPMENT INC.

Aurora, Illinois

Combined

By V. P. Armour
Meter Division Head
Dallas Power and Light Co.
Dallas, Texas

Service man installing compression type entrance sleeve with hand compression tool. The sleeves are used to connect aluminum drop wires to overhead secondary wires and to customers' outlet wires 1/0 and up.

Service crew foreman receiving orders over the two-way radio communication system which adds flexibility to combined operations plan.

◆ A COMBINED service and meter operation plan which groups all work relating to installation and maintenance of service drops and meters in a single division is working out successfully for this company.

The Meter Division, of the Distribution Department, is divided into four sections that are closely coordinated. It handles all the service and meter work usually assigned to two divisions or departments of an electric utility company. This division, consisting of 92 employees, 27 trucks and four passenger cars, installs and maintains all of the service drops and meters; inspects and tests meters in the field; repairs and tests meters in the shop; operates a precision Standards Laboratory; and maintains all the meter records.

The Service Section, under three supervisors, operates fourteen three-man service crews, two two-men instrument transformer crews, and four one-man utility crews. These crews, working out of two Service Centers, leave each morning with a complement of assignments and cover the 241-square-mile service area almost twice daily because additional orders are given out as they are released by the Customers' Accounting Division.

The supervisors assign orders to the crews and keep them informed in new developments, give them special instructions as needed, and assist them with the more difficult problems. They also assist electrical contractors and Commercial Department personnel in working out details pertaining to arrangements and locations of service outlets and metering equipment on large or special jobs.

The service crews regularly install service drop wires through size No. 4/0 and, in some instances, larger sizes should an emergency arise. Quite frequently they make

service and meter operation

temporary overhead secondary extensions where the customers' service would otherwise be delayed. The crews also install all the self-contained meters in connection with their service work.

Each service truck is equipped with a two-way radio, tools and materials for handling most types of service and meter installations. All trucks have two-wire reels, each of which holds a coil of approximately 500 feet of service drop cable. These reels accelerate the handling of drop wires. All personnel have been trained in the various phases of meter and service work which has created crew versatility, thereby making it possible to dispatch them almost anywhere on a moment's notice to handle any job pertaining to meter and service installations.

The two-instrument transformer crews install the meters and auxiliary equipment on all jobs where instrument transformers are needed.

The four one-man crews connect or disconnect services or meters, and replace damaged and overloaded meters.

Some four years ago, the company adopted the use of all aluminum service drop wires through size No. 4/0, and now is using through Size No. 2 in twist type cable only. The use of aluminum service drop created a number of problems, particularly that of corrosion where connections were made to customers' copper outlet wires and company's copper secondary wires. Different types of plating and tapes for covering mechanical connectors were experimented with resulting in most of the mechanical connectors developing serious trouble because of heat expansion and corrosion.

At the present time, compression-type service entrance sleeves, through size No. 1/0, are being used at customers' outlets. Experimental work is being done with compression-type connectors to connect aluminum drop wires to aluminum or copper overhead secondary wires, and to customers' outlet wires that are larger than

(Continued on page 128)

The meter test room includes several automatic meter test tables.

Standardizing laboratory showing master clock and test tables.

in the long run... it's O.Z.

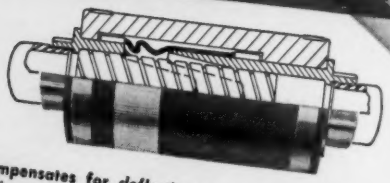
Type AX

Provides 4" expansion, contraction movement. Malleable iron head, body Hot Dip Galvanized. Weathertight head sealed by factory-installed high grade graphite packing. Insulating conduit end bushing eliminates cable abrasion. 10 sizes for conduit ½" to 4" diameters.

Type EX

Permits 8" conduit movement. Optional length sleeves, additional cost. Weathertight head sealed by factory-installed high grade graphite packing. Insulating bushings prevent cable abrasion. Hot Dip Galvanized finish. 13 sizes for ½" to 6" conduit diameters.

Type EXDS

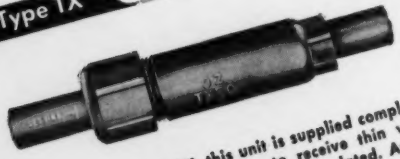


Compensates for deflection, expansion, contraction. ¾" movement all directions from normal; 30° angular movement. Also used as vibration damper between conduit sections. 10 sizes.

Type EXE

Weathertight end type expansion fitting. Designed for conduit terminating in junction box, where expansion, contraction take place. Supplied complete: locknuts, bushings. Standard finish, Hot Dip Galvanized. 13 sizes.

Type TX



Similar to the Type AX, this unit is supplied complete with extension nipples, ready to receive thin wall couplings. Standard finish is cadmium plated. Available in 6 sizes for conduit ranging from ½" to 2".

for the longer line of EXPANSION FITTINGS

In the long run, no line of conduit is more dependable than its components. When it comes to dependability in expansion fittings, look to O. Z. as the line that measures up! Five basic types provide the dependable answer to your fitting problems in conduit expansion, contraction, and deflection. O. Z. is the dependable line because it's the line with the *right size*, the *right type*, for every requirement!

O.Z. ELECTRICAL MANUFACTURING CO., INC.

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- CAST IRON BOXES
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- POWER CONNECTORS
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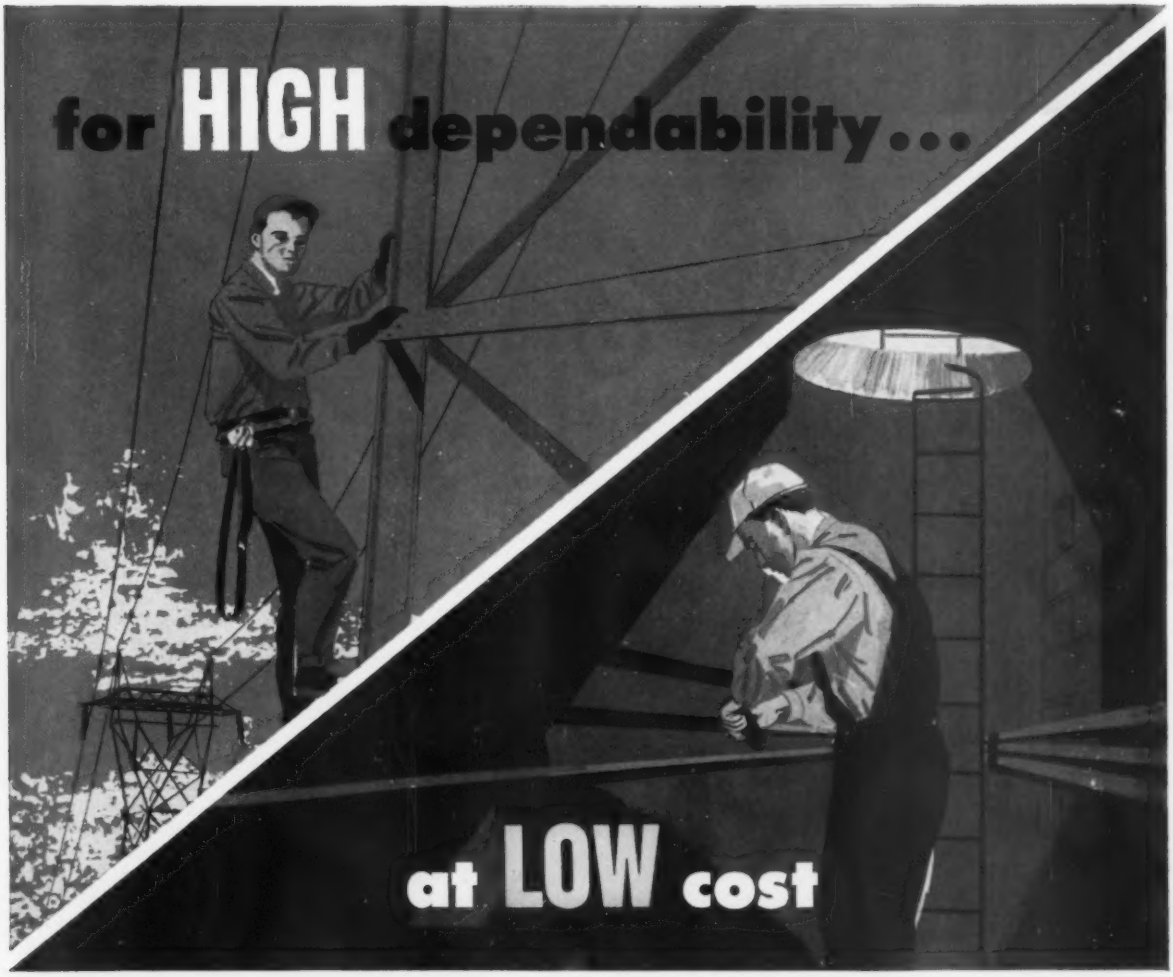

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for every electrical need!

From high line to cable vault Dutch Brand Plastic Electrical Tape meets the requirements of the job. It has high dielectric strength, over 1000 volts per mil of thickness, with stretch to conform neatly and smoothly to irregular shapes. It protects against corrosion, is weatherproof, waterproof, rot, mildew and fungus proof. Linemen and electricians know the value of dependable tape . . . and tape economy.

That's why they insist on safe, easy-to-use Dutch Brand Plastic Tape for every electrical maintenance, production and construction job. Available in the sizes and widths to meet every requirement.

Write for booklet—*In the market for new ideas on tape as a time-and-money-saver? Send for "Big Four in Electrical Tapes," our new booklet. Write today!*

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CT cabinet design saves metering space

An experienced meter engineer, well known for his contributions to the industry, has developed an improved method for housing metering transformers which results in marked wall space savings. The method he calls "To, Through, and Return" is described here.

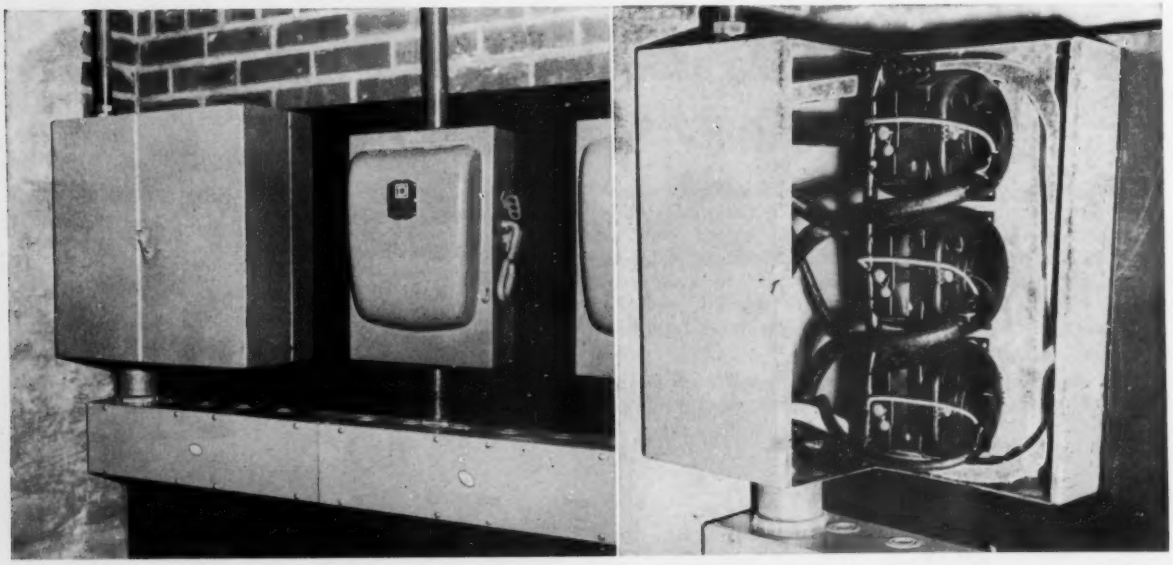
By C. E. Sloop
Division Meter Superintendent
Georgia Power Company
Columbus, Ga.

◆ IN BIG CITIES and in the thriving smaller ones alike, interior building space always goes at a very high premium and any equipment occupying such space most certainly must justify its presence and size. When new buildings are under construction and electrical equipment is installed, the cry "lack of space" comes every time. It frequently happens when this cry is the loudest the conventional utility approved cabinet for the meter transformers arrives, necessitating large dimensions to house the fan out sweeps required to get the large conductors through the transformers.

In keeping pace with progress, electrical equipment manufactures have in general succeeded to the satisfaction of all in making their products smaller and better. One resultant of this practice is the development of the 600 volt window transformer. Use in recent years has proved it superior for metering low voltage heavy service.

Use of this splendid transformer is now greatly enhanced by a new installation companion, a cabinet greatly reduced in size, unique in both design and method of wiring. This new cabinet houses the transformers and large conductors without the necessary fan out sweep and when used in the compact commercial and industrial buildings eases down the customary cry "lack of space." Mechanics like the ease of installation and the transformers are better located for the meterman's work. Shippers and warehouse men like its small size.

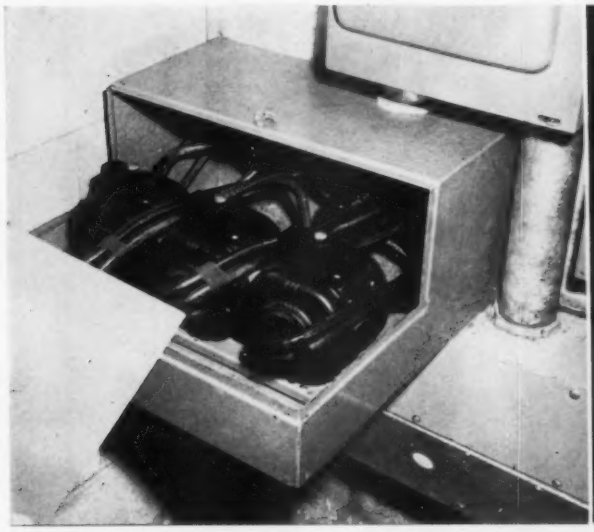
Stranded wire being concentrically wound, co-operates in the formation of a continuous bend that does not change in direction. Use of this principle is incorporated in the structure of this new cabinet. An oval loop is formed between the entrance and exit conduits. A loop in each conductor is positioned to the conduit as spokes to a hub. The wire in loop formation is through the transformer. This condition enables the smallest dimension of the new cabinet to



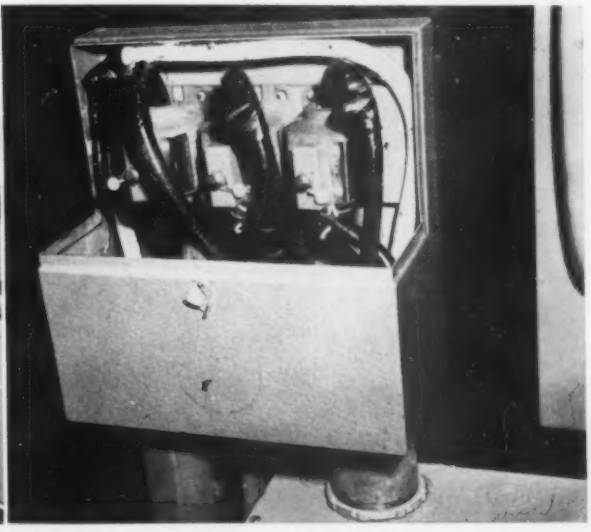
The 3½-inch underground conduit mains with three 350 MCM and one 3/0 enters at upper left. The one-inch conduit at top is to meter on outside wall. The open cabinet at right shows the 350 MCM conductors which enter at upper left and easily turn down into the gutter after passing through the JKP-O. The white neutral passes around inside for ease of meter connection.

The three-inch conduit and four 250 MCM mains on outside of building wall enters building through back of small cabinet. The thirteen terminal meter socket has a ten pole test block inside. At right,

after the RC-6A transformers slide on wires to their mounting location in the small cabinet, wires are placed one at a time through exit conduit and then pulled for loop size.



Parallel 3/0 circuits enter at rear in two 2½-inch conduits. Passing through JKP-O transformers, one set reaches switch at top while other enters lower gutter to reach switch. Parallel neutrals are unseen,



inside front edge. At right, 3" underground conduit enters left through the small cabinet with 4/0 wire through EMR transformers and exits into gutter. Taped connections are for potential wires.

occupy wall space, whereas in conventional cabinets the largest dimension occupies wall space.

In the new design cabinet up to 500 MCM conductors pull easily by hand into a very small loop. The difficulty in handling such large conductors in the old conventional large cabinets mounted flat on the wall stems from the necessity of requiring successive quarter bends to reverse direction.

This new cabinet in its dual function uses the back half for conduit entrance and exit. The current transformers are in the front half and parallel to the cabinet's length so their windows will receive the wire loop. Two of the concentric conduit knock-outs will form any corner desired for conduit runs, or to distribution housing equipment.

When current transformers are to be used careful thinking is required as to where they should be located to provide shorter service mains and where wall space can be more easily afforded. Other thinking prevails for the meter location, like better access for reading and hand reset of demand pointer.

These different needs are responsible for the present trend of separating the two, getting away from the old practice of meter and transformers being located together. A secondary run between

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Pull-Chain Lampholder

HERE'S THE INSIDE STORY

- Firmly protecting, tight fitting Dust Cover.
- Concentric Center Post and Spring Carrier exactly centered in body.
- Music Wire Spring—machine wound and tempered.
- Special Fibre Thrust Washer.
- Die-cut Ratchet and Actuator —highest quality insulation material.
- Extra quality Bead Chain and Carrier with Stop Ball.
- Commutator—accurately die-formed of finest electrical bronze — broached center bearing for positive trouble-free performance.
- Stationary Contacts of spring bronze—lubricated for long life, easy operation.
- Heavy terminals correctly angled for easy wiring.
- Glazed Chain Hole for quiet easy pull. Chain's positive snubbing action protects mechanism.
- Ratchet Angle precisely formed for positive action.
- Highest Quality Porcelain Body.
- Highest quality electrical copper Screw Shell.
- Center Contact — spring bronze formed for positive contact with lamp base.

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VASTLY SUPERIOR MECHANISM . . .

Finely tooled parts of highly selective material, precision-engineered, insure longer trouble-free life, fewer call-backs, completely satisfied customers. One-piece design assures quick, easy installation.

67 years' experience and strict adherence to superior standards are behind every P&S Electrical Wiring Device. Write Dept. ES-18 for details on any of the long line of P&S Devices.

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Simplex Wire & Cable Company's new 1,400,000 volt impulse generator — the first of its kind to be installed in North America — represents just one aspect of research at Simplex. Simplex scientists and engineers originated the process of vulcanizing portable rubber cords and cables in a lead mold. Simplex developed the first heavy-duty portable electrical cable — Simplex TIREX. The first truly moisture-resistant rubber insulation was the outcome of a commercially acceptable method of deproteinization developed by Simplex. Simplex designed the first interlocked armored cable for underground service — Simplex CONDEX. And now — Simplex C-L-X — the portable, corrugated metallic duct WITH SEALED-IN CABLE. **SIMPLEX WIRE & CABLE CO.,** Cambridge, Massachusetts and Newington, New Hampshire.

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Highest quality cables for: Mining • Power & Lighting • Construction • Transportation • Communications • Signalling

SPECIALLY DESIGNED HUBBARD BRACKETS

the two desirable locations is so easy.

After heavy wire pulls are made this new cabinet is placed with lock nut and bushing on the conduit end. After the transformers are on, the wires are individually placed through the exit conduit and pulled by hand for loop size and reach to the nearby distribution terminus. The cabinet may be located under or at the end of a low horizontal wire gutter and many other places that were heretofore impossible to use with the conventional large cabinets. The new cabinet works effectively in either horizontal or vertical positions.

Now available in two sizes, each cabinet is designed to work with assorted conduits, wire gutters and other service entrance equipment in its class.

The smaller cabinet weighs eighteen pounds and is 7″ x 14″ extending 14″ from wall, or 14″ x 14″ extending 7″ from wall. This replaces the thirty-four pound, 18″ x 22″ cabinet. The small cabinet will take up to 3″ conduit, 4 - 250 MCM conductors and 3 transformers, types JCA-O, EMR or RC-6A.

The larger size weighs thirty-eight pounds and is 10″ x 20″ extending 20″ from wall, or 20″ x 20″ extending 10″ from wall. This replaces the eighty-two pound, 30″ x 32″ cabinet. The large cabinet will take up to 4½″ conduit, 4 - 500 MCM conductors and 3 transformers, types JKP-O, EMO or T W M.

The entrance and exit conduits are offset so as not to face each other. This places the wire turning in so it does not interfere with the wire turning out. Sufficient knockouts in top, back and bottom of cabinet give a choice to effect this conduit offset. Several 1″ knockouts allow the secondary conduit

(Continued on page 82)

Meter department operations

By H. M. Edmonds
Duke Power Company
Anderson Branch
Anderson, South Carolina

◆ TO OPERATE the meter department satisfactorily, well trained men are needed for this type of work. A good meter department is most valuable to the utility company and its relationship to the customer.

The men must know component parts and functions of the watt-hour meters, as well as their locations; fundamentals of meter testing; meter terms and definitions; and application for meter services. A meter can be installed in service and rotate, but yet not register correctly; therefore, selection of the proper meter for a particular installation depends on the type of service being metered. Accurate registration of the energy consumption can only be had if the correct meter is used and is properly connected.

The duties of a meter man, with most utilities, are testing meters in the field and in the meter shop; repairing meters; and in some cases, installing meters and instrument transformers. When working with instrument transformers one must remember to short circuit the secondary of a current transformer before opening any part of the secondary circuit; but on the potential transformer circuit, never short circuit the secondary. Always observe the polarity markings of the transformers in making the installations in order to ensure proper connection of metering equipment.

When a meter is being repaired and the register is removed from the meter, special care should be given to the register so that it will not be damaged in any way. After the meter repairs are completed it is necessary to see that the correct register is placed on the meter. Then check the meter for being grounded in order to prevent future trouble; also note that the cover gasket is good so that dust or moisture will not be able to get inside. Now the meter is ready to be tested. If the meter needs a new jewel, bearing, ball, or disk the tester will make the change. The test is recorded on the meter test card or meter test sheet. Then the meter is sealed and ready to go into service again.

Customer contact

The meter man doing field work or testing often comes into contact with customers who seldom come into the office for information. He must always be on the alert to answer their questions.

The field tester carries a "one hand kit" which contains a test meter, phantom load and lead. This kit is equipped with a tray for holding small tools and parts such as jewels, bearings, balls, ball droppers, jewel wrenches, small brushes, pliers, screwdrivers, and sealers and seals. The stock in the tray may be replenished as it is needed. This same type kit may be used for testing meters with instrument transformers. The tester must be equipped with an ammeter, voltmeter and stopwatch for checking the load if he is to give an accurate account on the current transformers for overloading.

Every new installation using instrument transformers should be checked carefully. The customer's load should be on at least fifty per cent when this check is made. This enables the meter man to know that the connections were made correctly.

Meter location

The location for the meter should be on a solid wall with no vibration. It should be in a place that is accessible at reasonable hours for testing or reading. It should not be placed over six feet in height from the ground or floor level; and if possible, it should be placed over vacant space.

The watt-hour meter is the most accurate measuring device obtainable. A good meter man knows the value of a meter and knows how to care for them.

The meter reader also has an important job of reading the meters correctly. He should read the meter on the same date of each month or as near to that date as possible.

In the meter department there is always much work to be done. Meters that have been removed from service for such causes as overloading, damaged by lightning, or the building being remodeled or changing its type of service, must be cleaned, painted, and tested before going into service again. Current transformers are often changed because of an increase in the load or the building being remodeled or changing its type of service.

The utilities company and their customers both want the same thing and that is for the meter to be correct.

SPECIALLY DESIGNED HUBBARD BRACKETS ANSWER ALL THE REQUIREMENTS FOR FLUORESCENT LUMINAIRES

Supporting the weight of a heavier fixture is only one of three important requirements for fluorescent luminaire brackets. The design must also be able to withstand 100 mile per hour wind velocities applied over a larger projected luminaire area as well as support the added seasonal weight of an increased snow- and ice-loading area.

Not content with laboratory tests alone to indicate the importance of "weather factors," Hubbard and Company made field installations to subject various designs to actual service conditions. One of the early observations made during this testing was the conclusion that "heavied-up" models of brackets designed for mercury vapor and filament type fixtures do not make satisfactory supports for fluorescent luminaires. As a result of this testing, an entirely new line of Hubbard galvanized steel Street Lighting Brackets has been developed especially for fluorescent installations.

Write us for more information on the two designs shown, as well as a description of other styles available.

HUBBARD AND COMPANY

Pittsburgh 1, Pa. • Chicago 50, Ill. • Oakland 8, Calif. • Plano, Texas

"Dancing in the wind" has been eliminated by angle steel "tie rods" and specially designed bracing in new Hubbard designs. (Below) Stock No. 23032, for use with luminaires with a maximum projected area not to exceed 8 square feet. Extension from pole—4 feet. Rise—14 inches. (Above) Stock No. 23908, for use with luminaires with a maximum projected area not to exceed 8 square feet. Extension from pole—approximately 8 feet. Sizes to 20 feet.

THE ORIGINAL DUAL-GRIP ENTRANCE HEADS*

BY WEAVER

LOOK FOR THE PATENT NUMBER—
YOUR PROTECTION AGAINST COPIES!
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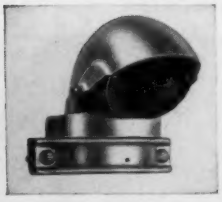
easier to use . . . just tighten the screws

"Dual-Grips" save time and money.
When "Dual-Grips" are used on EMT,
they're "on to stay"
—with no special fittings.

With rigid conduit, the electrician just slips the head on and tightens the screws.
No valuable time wasted cutting threads.

Lightweight aluminum alloy — moistureproof—
rust proof. Eight sizes: ½", ¾", 1", 1¼",
1½", 2", 2½", 3".



NEW COMBINATION ENTRANCE HEADS
. . . head and reducer in one compact, easily installed unit! No mast threading.
For 2" or 2½" rigid conduit or pipe.

MR. WHOLESALER: STOCK THESE POPULAR HEADS NOW — THEY SELL!

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CLARK Type "CY" Starters, sizes 0 and 1, now have higher NEMA horsepower ratings

As shown in the table below, NEMA maximum horsepower ratings for size 0 and 1 AC magnetic across-the-line starters have been increased. Clark Type "CY" starters now available to meet these new standards will, in many cases, permit you to meet your requirements with smaller sizes. You can at once take advantage of the money and space savings made possible by this re-rating.

CHANGES IN NEMA STANDARDS FOR MAXIMUM HORSEPOWER RATINGS OF AC MAGNETIC STARTERS AND CONTACTORS

SIZE AND VOLTAGE RATINGS	MAXIMUM HP RATINGS	
THREE PHASE	OLD	NEW
Size 0 110V	1½	1½
Size 0 208/220V	2	**3**
Size 0 440/600V	3	**5**
Size 1 110V	3	3
Size 1 208/220V	5	**7½**
Size 1 440/600V	7½	**10**
SINGLE PHASE		
Size 0 110V	1	1
Size 0 208/220V	1½	**2**
Size 0 440/600V	2	**3**
Size 1 110V	1½	**2**
Size 1 208/220V	3	3
Size 1 440/600V	5	5

NOTE: HP ratings for plugging and jogging duty have not been revised.

IN ADDITION TO COST AND SPACE SAVING BENEFITS OF THE NEW NEMA RATINGS, CLARK Type "CY" STARTERS OFFER MANY OTHER ADVANTAGES:

Greater Dependability and longer life

- Heavy-duty mill-type construction.
- Large silver-to-silver twin-break contacts.
- Vertical lift, free-floating magnet uses no springs; pull characteristic assures positive contact closing and keeps magnet slam to a minimum.

Easier Maintenance

- Contacts and contact springs quickly and easily inspected—without tools.
- All parts readily accessible and replaceable from front without removal from panel or enclosure—screwdriver and wrench only tools needed.
- Magnet coils easily replaced.

Simplified Installation

- Generous wiring space.
- All terminals face the front.
- Pressure-type terminals line and load.

...and many others

These increased horsepower ratings for AC controls will be adopted for all forms of Clark across-the-line starting equipment.

Revised Clark Catalog sheets and price lists covering the new NEMA ratings are available on request.

The **CLARK CONTROLLER** *Company*

Everything Under Control — 1146 East 152nd Street • • Cleveland 10, Ohio

IN CANADA: CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

Safe operation of truck power winches

◆ INDUSTRY has grown greatly during the past 50 years. And with its growth have come new operations and new equipment—and new problems.

Such a problem is how to use truck-mounted power winches safely, the National Safety Council points out.

Truck-mounted power winches are employed by public utilities firms and the construction and petroleum industries, to name a few, and are used to move, raise or lower heavy loads, for pulling cable or for general work.

Many new trucks come equipped with the winches. According to George MacDonald, senior consulting engineer in the Council's industrial department, the new trucks have brought this hazard: drivers frequently operate power winches without prior training, which is, according to MacDonald, "as important as learning to drive the truck."

Moreover, in the past only large firms had truck-mounted power winches, and these concerns had a man trained and assigned to operate the equipment. Now, though, a truck driver may find himself responsible for its operation.

How can the danger be lessened? Here are a few specific practices and ideas as given in Council Data Sheet D-441—one of many prepared periodically by safety engineers:

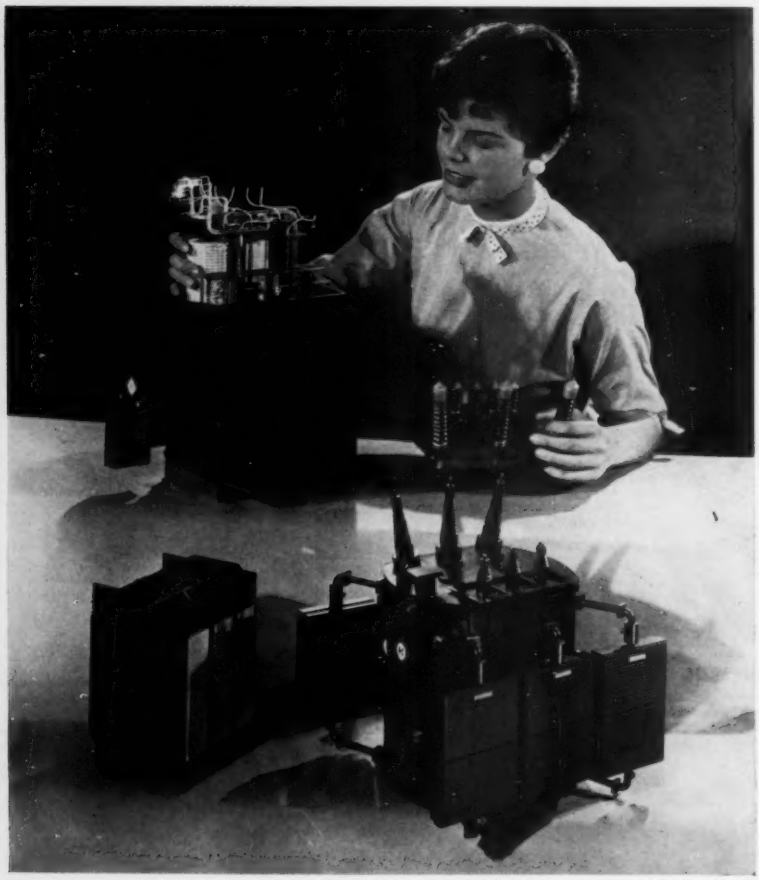
(1) Persons not familiar with the controls of truck-mounted power winches first should check control lever positions against an instruction plate, which should be mounted in full view of the operator and should indicate various operating positions.

(2) A lock or latch should be provided to keep the power take-off lever in "off" position while the truck is being driven.

(3) If a clutch engages so slightly that there's danger of it disengaging, air or vacuum devices can be used to hold it engaged and prevent a load from being dropped.

"Regardless of the type of installation—back-of-cab or front-of-cab—drivers must be trained to follow a few simple winch-operating safety rules," the safety engineer says.

"This may be a new hazard for you. Only education can remove it."



MULTUM IN PARVO — Scale models have solved the problem of conveniently showing the intricate design of large Allis-Chalmers transformers. These models illustrate the fine construction features used during actual manufacture. Prospective purchasers can readily examine them on a desk or table. The core form transformer being disassembled includes an inert gas system, uni-directional breather, tank, relief diaphragm, and load tap changer. The core and coil assembly, partially removed, is shown in stages of construction.

Polyphase training of utility metermen

◆ A POLYPHASE METER training course has been made available to utility meter men throughout the United States by General Electric Co.

Prepared by the company's Meter Department at Somersworth, N. H., the course is meant to provide meter men with theories, applications, and methods of testing and inspecting polyphase watt-hour meters of all types and makes.

It was designed for high flexibility — the full course runs five days, but can be tailored down to two days — to conform to the requirements of meter superintendents involved.

The six sections of the full course include History and Background of Polyphase Metering; Principles of Electricity; Polyphase Watt-hour Meter Components and Functioning; Polyphase Watt-hour Meter Application and Installation; Inspection, Testing, and Maintenance; and KVAR-Hour Metering Polyphase. Any section can be abbreviated or eliminated on recommendation of the utility meter superintendents.

All essentials for giving the course have been enclosed in a special case distributed to General Electric meter specialists in district sales offices throughout the country. Included in the case is a special device to demonstrate the phase relationship between poly-

SOUTHEASTERN ELECTRICAL WHOLESALERS ASSOCIATION, INC.

P. O. Box 176—Ben Hill Station
Atlanta 11, Georgia

All Branches of the Electrical Industry Are Invited to Come South

For SEWA'S Eighth "Industry Day" Meeting At The Biltmore Hotel, Atlanta, Ga.

"Where All May Find a Common Meeting Ground and Sounding-Board"

Meet Your Friends and Competitors
January 29-30-31, 1958

PLAN TO ATTEND THE

SOUTHERN BREAKFAST

To be held in conjunction with the SEWA Industry Day Meeting and sponsored by the Southeastern Electrical Manufacturers' Representatives Club.

Our speaker will be Leo P. Aikman, *Atlanta Constitution* columnist—he's hilarious and will have you rolling in the aisles.

Menu:

- Fruit Juice
- Southern Country Ham and Eggs
- Grits
- Hot Biscuits
- Coffee

Guests will be the SEWA members and their wives, so make your plans to attend.

Write for reservation.

Southeastern Electrical Manufacturers Representatives Club of Atlanta
806 Peachtree St., N. E.
Atlanta 8, Ga.

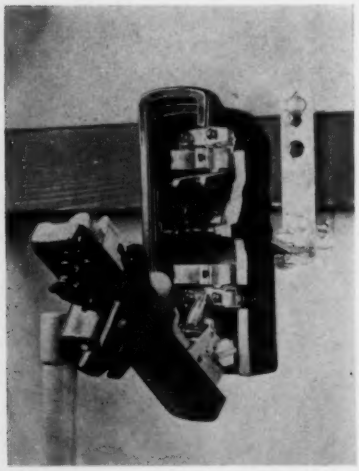
phase currents and voltages, built-in flipchart, instructors manual, student envelopes for meter men taking the course, a "tear-down" sample of the new V-62 polyphase meter, and considerable supplementary information comprised of pertinent polyphase metering publications.

H. F. Crotty, Meter Department application engineer who designed the course, said that it has been pre-tested at Somersworth and at a few selected utilities. Reactions, he added, were encouragingly enthusiastic.

Gas converts cutout to full-load switch

A TINY, replaceable gas-filled cylinder mounted on the door makes full-load switching devices out of all of General Electric's new 100-amp enclosed fuse cutouts.

A high-pressure blast of insulating gas blows out the arc when the cutout door is opened. The arc drawn at the lower terminal burns through the cylinder tip and is extinguished by the gas. The action is so fast, G-E engineers report, that load switching is accomplished before the door is fully open. Oscillograph tests show that all currents up to the cutout's rating are interrupted in 3 to 7 cycles.



This new full-load switching device on 100-ampere enclosed fuse cutouts uses compressed gas to blow out arc when door is opened. Arc from lower terminal burns through tip of replaceable cylinder at door bottom, releasing blast of insulating gas to quench arc.

After each operation, the gas cylinder must be replaced. Cylinders come in plastic clips of six, to be hung on the lineman's belt or tacked to the pole near cutouts.

The loadbreak device makes available a low-cost switch at each cutout location. Feeder or branch lines may be disconnected for maintenance or repair without having to go back to substation breakers and interrupt service to other parts of the system.

Loadbreak is operated by opening the door with a switchstick in the normal manner. It does not interfere with the overcurrent protection function of a fuse cutout and there are no exposed live parts.

Mobile power for Mississippi

◆ THIS MOBILE transformer rated 7,500 kilovolt-amperes will help assure dependable electric service for customers of Mississippi Power & Light Co., Jackson, Miss. Built by General Electric's Power Transformer Department, unit is mounted on semi-trailer 33 feet long, with three axles and 12 jumbo tires.

The mobile unit will be used for by-passing permanent substations during maintenance periods and also will be available for emergency service in case of disaster, fire, or flood in all parts of the Mississippi Power & Light system.

When the unit is backed into substation yard, high tension power lines carrying 115,000 volts are connected to high-voltage bushings at back of transformer. Distribution lines at 13,800 volts are connected to smaller, low-voltage bushings at front of unit. Station's permanent equipment can then be de-energized for inspection, cleaning and repair, without taking station itself out of service.

Although transformer's high-voltage rating is 115 kv, it was designed for 230 kv test. Insulating oil circulates inside transformer and carries internal heat to fan-cooled radiator at rear of trailer.

Gang test board

(Continued from page 62)

the primary of the loading transformer before any breaking of the current circuit is affected. These switches have proven to be very valuable in the construction of test equipment and exhaustive use has shown that so long as the microswitch operates then the switch will hold the load very well.

Two smaller snap action switches complete the board's switching arrangement. One is used to cross phase the potential for power factor tests and the other is used as a selection switch to short out the photoelectric counter and permit manual operation.

Specify PHELPS DODGE HABIRITE-INSULATED ARMO-LOK CABLE

Phelps Dodge Armo-Lok cable with Habirite (butyl rubber) insulation—a companion to Phelps Dodge Varnished Cambric insulated interlocked armor cable—is more than "just another interlocked armor cable."

Habirite—developed through years of Phelps Dodge experience in the design and manufacture of high voltage cables—is a specially engineered butyl rubber compound. It far surpasses any other type of rubber insulation for dependable service.

Habirite offers these distinct advantages over other rubber insulations:

- Far greater resistance to heat and oxidation with consequent higher temperature rating and lower conductor size and cable cost.
- Far greater resistance to ozone found around high voltage equipment.
- Far greater mechanical toughness.
- Better electrical properties affording a greater safety factor in operation.
- Highest uniformity due to controlled uniformity of raw material.

★ ★ ★

See your Phelps Dodge distributor for information on a complete Armo-Lok system. For catalogue and specification data on Habirite or Varnished Cambric insulated Armo-Lok cable, write: Dept. ES Phelps Dodge Copper Products Corporation, 300 Park Avenue, New York 22, N. Y.

PHELPS DODGE COPPER PRODUCTS CORPORATION

SALES OFFICES: Atlanta, Birmingham, Ala., Boston, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Fort Wayne, Greensboro, N. C., Houston, Jacksonville, Kansas City, Mo., Los Angeles, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Rochester, N. Y., San Francisco, St. Louis, Seattle, Washington, D. C.

The arrangement of the switches has been so designed to eliminate many steps in the actual testing of meters. After the board has been set up for operation on one type of meter, the only variation in quantity testing will be a one-switch operation from light load to full load and a one-switch operation from unity to 50 per cent power factor.

The full potentialities of a gang board can only be realized when a great number of meters are available for test. This can be furthered by removing meters due for periodic tests and bringing them into the shop to the gang board for testing. In this way, not only a fast and effective test will be made but also much additional maintenance can be performed which would be impractical to duplicate in the field.

This procedure has been the practice in our company for eight years and has resulted in highly efficient and effective testing, and it is felt that the gang board has been primarily responsible for the success of this operation.

Routine meter tests

(Continued from page 60)

From the route books in the local offices, lists were made, in account number order, of all meters in Route Book Number One, giving name of customer, address, account number, and company meter number. These lists were then taken to the division meter department office and compared with current shop tests files. Meter cards in this file are kept in company number order. Matching meter numbers on the lists to the cards in the file, all meters that have had shop tests within the last four years are checked off. Those remaining on the list are compiled into a new list and copies are sent to the local managers for distribution among the servicemen.

Slack time filled

With these lists in their truck the servicemen never run out of something to do. When his regular work slacks off, or when he is in the area covered by the list and has some extra time, he changes meters and makes service orders to cover. Each local office furnished with lists of meters to change are kept supplied with shop tested meters, and the removed meters are picked up and brought in to the division meter shop for tests, and re-distribution.

One trip per week by the meter department truck is usually sufficient for this job. Sometimes the division stores department truck handles the chore when it is in the area.

One copy of each list is kept posted in the division meter department office, and as the service orders come in from the towns they are checked to the lists and marked off. When a list is completed, a new one is made from another route book, in the order in which they are read each month, and the cycle starts over again.

In this manner we have completely covered two towns in the division, involving some 2,500 meters, and all meters connected in these two towns have been shop tested within the last four years. This operation has been completed within the last six monhts.

We now plan to begin the same operation in two more selected towns, since experience has proved that we can work only two towns at a time, keeping them supplied with tested meters, and still keep up with our other work in the division.

One aspect of this operation that has proved to be a big help, along with the exceptional cooperation of local managers and servicemen, is the fact that, in our division, our practice has always been to bring meters into the division shop for checks and tests, whenever they are removed for any reason, before they are reinstalled.

Shop tests

This practice has been the basis for a good percentage of meters listed from the route books being removed from the list when checked to the current shop tests files. On an average, forty per cent of the meters listed from the route books have had shop tests within the prescribed length of time, and are not listed for change.

Another good reason for the success of this operation in our division, and one that might make it difficult in other areas if conditions are different, is that all meter files covering shop tests, service orders, etc., are centrally located in the division meter department office, and are easily accessible. All our records are in company meter number order, and the record on any meter in question can be located quickly.

The primary and all-important reason, however, that will apparently bring about the success of our venture, is the complete cooperation that exists among departments and towns in our division. Such cooperation, or the lack of it, could easily be the difference between success or failure if it is tried in other areas. Our division, as mentioned previously, is relatively small when compared with others, and some of our methods and procedures might even be referred to as primitive, but the cooperation and working-togetherness attitude that prevails among our employees leaves nothing to be desired.

Many reasons for skepticism will no doubt arise when considering this procedure in other sections of the country, and many skeptics will have ample reason for doubt, but it has been the experience of the writer that any project that will work on a small scale has possibilities of success on a much larger scale, if the general principles of procedure are followed, and it is hoped that the methods outlined here will be of some help to others faced with the problem of routine tests.

CT cabinet design

(Continued from page 74)

to the meter to leave the cabinet as desired.

Long experience by the author establishes the fact window type current transformers never fail from electrical flash, or coil failure, therefore there is no need they be located in the service entrance to facilitate change. Window type current transformers are customarily selected with capacity to match the wire size, therefore failure from overload is not expected. Window type current transformers operate continuously until perhaps the wire size is enlarged at which time both the transformers and the wire size are enlarged together.

The "To, Through and Return" loop carries the wire to the transformer, through the window and returns it to the conduit.

Did you ever observe that new wire forms loops when being taken from the roll? This new cabinet and the To, Through and Return principles employ these easy roll loops to provide a space saving need for use where ever the 600 volt window transformers are used.

The first cost of dry-type transformers is not always the total final cost

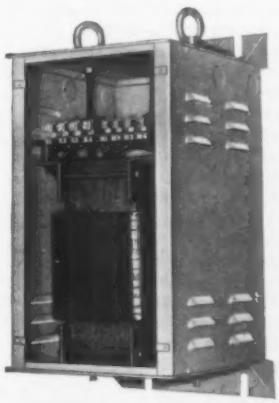
Because *Some dry-type transformers cost more to install than others.*

But SORGEL air-cooled dry-type transformers cost less to install because they are all self-contained in a single unit — either single phase or 3-phase — equipped with substantial wall brackets with slots for bolts, or with floor mounting base. No separate brackets to make or buy. Easily accessible, roomy connection compartment, with wide choice of knockouts. Equipped with solderless terminals and permanent connection diagram.

15 to 50 Kva 3-phase. Wall mounting.
Connection compartment panel removed.

Because *Some must be installed in locations that require longer feeders and more expensive wiring.*

But SORGEL transformers are so quiet in operation that they can be installed in almost any convenient place inside of buildings, close to the load center. This results in shorter feeders, better voltage regulation, more efficient distribution, and lower wiring cost.



20 to 75 Kva single phase. Wall mounting.
Connection compartment panel removed.

Because *Some require a larger rating for a certain load.*

But SORGEL transformers do not require a larger rating than the load, because they are guaranteed to carry their full rated load continuously at high efficiency. They are so liberally designed that they can carry an overload during an emergency at a safe operating temperature. Vacuum impregnated windings brazed to solderless terminals assure years of trouble-free service.

SORGEL TRANSFORMERS

Sales engineers in principal cities.

Consult the classified section of your telephone directory or communicate with our factory.

Stock carried by jobbers in the following cities:

New York, N. Y.	Chicago, Ill.
Buffalo, N. Y.	Rock Island, Ill.
Roxbury, Mass.	Rockford, Ill.
High Point, N. C.	Richmond, Ind.
Raleigh, N. C.	Cedar Rapids, Iowa
Philadelphia, Pa.	Davenport, Iowa
Cincinnati, Ohio	Omaha, Neb.
Cleveland, Ohio	Beaumont, Texas
Louisville, Ky.	Los Angeles, Calif.

Complete Line

¼ Kva to 2500 Kva single phase.
1 Kva to 3000 Kva 3-phase, 2 phase, and ... phase changing.
All standard voltages, such as 120, 208, 240, 480, 600, 2400, 4160, 4800, 7200, 13,200, and up to 15,000 volts, and any intermediate or special lower voltage.

SORGEL ELECTRIC CO., 835 West National Ave., Milwaukee 4, Wisconsin

40 years' experience in the development, manufacturing and application of transformers

Notes on new utility equipment

Closed-circuit television equipment for industry

DESIGNED to satisfy the demands of every application of closed-circuit television from the least expensive to the most elaborate, the new line being manufactured by Allen B. Du

Mont Laboratories, Inc., 750 Bloomfield Ave., Clifton, N. J., includes the self-contained TC-100 television camera and the de luxe TC-200 television camera and control unit.

Accessories and components are all interchangeable for use with either camera chain, including lenses; turrets; drive motors; remote camera controls for focus, iris, and turret drives; pan-tilt mount and remote control; tripod; eight-inch video monitor (17-inch monitor also in line); switching units; cables; connectors; power cords; interlace adapter kit; handset for sound communications; and weatherproof housings. The line also includes voltage regulator sync generator and distribution amplifier; dustproof and explosion proof housings, and other accessories to add to flexibility of systems.

For additional data, ask for item U-901, using the coupon on page 125.

Compressor tool and connectors simplify service and wiring

A "SHURE SPLICING" package consisting of a complete line of service connectors, taps and pin terminals which can be installed by a new pocket-size compression tool has been introduced by The Thomas & Betts Co., 36 Butler Street, Elizabeth, N. J.

The new UT2 "Shure Squeezer" tool is the smallest compression tool made for line work. Weighing 20 ounces and measuring 9½ inches, it can be operated easily and safely wherever a lineman can use a small wrench or line pliers. The tool releases only when the compression action is completed to assure full compressions at every stroke. Its lever design gives the UT2 a mechanical advantage as high as conventional tools two or three times its size.

Connectors in the Shure Splicing package are Shure Splicers for house service connections, angle taps for distribution line connectors and pin terminals for terminating aluminum conductor to copper terminal facilities. The splicers and taps are equally suitable for aluminum and copper conductor.

All connectors are square in shape to key in the installing die of the UT2 Shure Squeezer. This feature also provides positive alignment of angle taps in the tool. Connector surfaces are coated with a new joint compound, a high temperature grease with high moisture resistant properties. Each connector is vacuum packed in a transparent vinyl jacket to assure clean connections.

Shure Splicers and angle taps are available in all conductor combinations. The UT2 tool installs Shure Splicers to a maximum of #1 Str. and #2 ACSR. It installs angle taps to a maximum of #2 Solid and #4

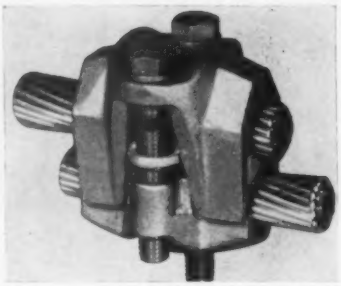
ACSR main and #1 Str. and #2 ACSR branch. The new Shure Squeezer's installation range for pin terminals is to a maximum of #1 Str. aluminum and #2 ACSR.

For additional data, ask for item U-902, using the coupon on page 125.

Aluminum clamps enclose conductors

ALUMINUM 2-bolt clamps which include a spacer with wrap-around finger, enclosing the conductors over the fitting's entire range, from maximum to minimum, are being manufactured by The Penn-Union Electric Corp., 315 State St., Erie, Pa.

The greater contact surface gives increased conductivity and grip, and minimizes cold flow of the cables. It's a one-piece fitting, as the long bolt is staked, and short bolt has a retainer washer, so there are no loose parts to drop off during installation.



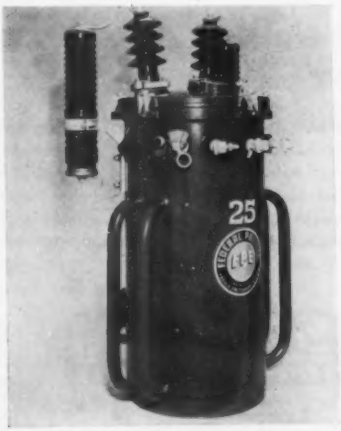
The top and bottom members are cast from high strength aluminum alloy. For maximum conductivity, the spacer is pure aluminum and especially treated at the factory to prevent aluminum oxide from reforming, giving a low-resistance path from run to tap.

For additional data, ask for item U-903, using the coupon on page 125.

New protected distribution transformer line announced

A NEW LINE of fully protected distribution transformers for utility and industrial services, designed to provide many features favored by electric utility engineers, has been announced by the Pacific Switchgear Division, Federal Pacific Electric Co., 5815 Third St., San Francisco 24, Calif.

Full current protection for ratings from 10 to 100 kva is provided by type FCP. Full current protection



plus surge protection is provided by type FSP.

Both types incorporate internal circuit breakers, internally mounted primary fuses, warning signal lamp and emergency overload device.

Circuit breakers are mounted directly above core and coils, submerged in oil. They are tripped by

bimetal elements which are sensitive to transformer winding temperature. Breakers are series-connected in the low voltage winding.

As maximum safe transformer load is approached, temperature rise deflects the bimetal and connects a red warning lamp. If load and temperature continue to rise, further deflection trips the breaker and disconnects the secondary band.

Service can be restored while the transformer is hot by movement of an emergency overload lever which is conveniently located below the warning lamp. When the lever is moved to maximum position, warning lamp and breaker settings are advanced to permit nominal overloading. Movement of the lever to reset and reclosing position disconnects the warning lamp and closes the breaker. Excessive overload condition will automatically recycle the protective devices when the lever is held in "on" position.

Primary fuses, for each incoming line, are located in primary bushings or on transformer terminal boards.

Type FSP transformers have all the above protective features, plus surge protection from a valve type lightning arrester. The valve type arrester inner parts will not burn during repetitive operation, so short circuit currents are eliminated during discharge. The arrester is mounted close to primary bushings to provide external air gap to ground.

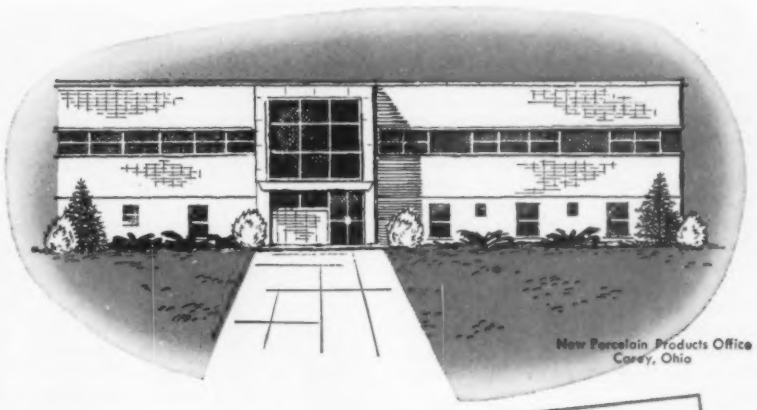
For additional data, ask for item U-904, using the coupon on page 125.

Lightning arrester line features many improvements

INCORPORATION of the Dynagap, with an entirely new approach to lightning arrester follow current control, has permitted many important advances in Thorex lightning arrester design. The innovations include big improvements in both operational and physical characteristics. Thorex lightning arresters are manufactured by the Ohio Brass Co., 380 North Main St., Mansfield, Ohio.

The Dynagap itself, among other attributes, has the ability to perform approximately 90 per cent of the total 60 cycle power-follow current limiting duty. This removal of a major share of power-follow current limitation duty from the valve blocks permits an entirely new concept of valve block composition. The result of advanced valve block development is an exceptionally high degree of surge current durability needed to deal with the extremely long duration disturbances typical of today's power system operations.

Thorex Dynagap's principal virtue is its ability to stretch the arc to 140 times its original length over cooling surfaces. Thorex station type arresters, with Dynagap, have 7.3 inches of arc interrupting distance per kv of arrester rating. This is from five to


New Porcelain Products Office
Carey, Ohio

You are invited

TO VISIT

PORCELAIN PRODUCTS

NEW OFFICES AT

CAREY, OHIO

Porcelain Products' Low Voltage Division offices, formerly located at Findlay, Ohio, are moving into a new building adjacent to the plant at Carey, Ohio. Consolidation of plant and offices will increase the operating efficiency of the Division resulting in improved service to you, our customers.

The construction of this building is evidence of our plans for continued growth and expansion—plans backed up by many years of experience of two great companies, Porcelain Products, Inc. and A. B. Chance Company of Centralia, Missouri. Porcelain Products, Inc. is a subsidiary of A. B. Chance Company.

The High Voltage Division of Porcelain Products will continue to serve you from their offices and plant at Parkersburg, West Virginia.

Porcelain Products manufactures dry process porcelain for low voltage applications at Carey, Ohio, and wet process porcelain for high voltage use at Parkersburg, West Virginia.

PP INC.

A-B-C INDUSTRIES

Please note NEW address, effective September 20:

Porcelain Products, Inc.

225 NORTH PATTERSON ST., CAREY, OHIO

ten times any previous accomplishment.

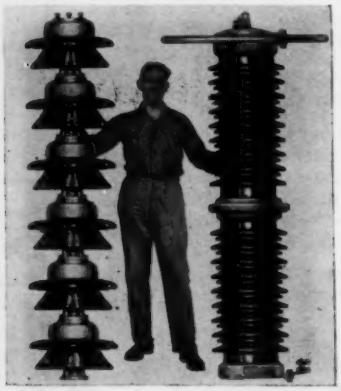
Small size of the Thorex Dynagap has enabled the arrester to be shortened to one-third the height of conventional models. Typical of the radical height reduction in the Thorex line is the arrester made for 345 kv service: it's only 9.5 feet tall and 16.5 inches in diameter. The Thorex arrester for 230 kv is only 86 inches high and 138 kv only 59 inches.

No external bracing or support is required in any size or voltage rating. All high voltage station type Thorex arresters approximately equal the height of a NEMA standard switch insulator stack of equivalent voltage rating.

Miniaturization of the elements in Thorex high-voltage lightning arresters has made it possible to eliminate all stacking units and house the arrester in a single, electrically continuous porcelain casing. This eliminates arrester failures due to the overpowering influence of external leakage under contaminated conditions.

The Dynagap, with its small size, is used throughout the expanded Thorex line. This line consists of three principal grades. Station Type MPR, featuring electrically continuous housings in reduced heights, will be available in line to ground ratings of 79 to 276 kv. Type MP, meeting the same electrical standards, but using small diameter housings, covers a range of ratings from 3 to 73 kv. Intermediate Type GP extends from 3 to 121 kv.

Added to the Thorex lightning arrester series, and announced for the first time, is the new Dynagap distribution arrester which combines a highly improved order of performance with a radical reduction in size—some models being less than half the dimensions of distribution types presently available. This new group of O-B Thorex arresters, designated as Type DV, is available from 1 to 15 kv, and uses essential Dynagap parts identical to the heaviest-duty station types.



For additional data, ask for item U-905, using the coupon on page 125.

Angle spar connectors for wood pole structures

FOR GREATER flexibility in joining various types of wood pole structures, Pole Hardware Division, Malleable Iron Fittings Co., Branford, Conn., announces new universal angle spar connectors in two sizes.

The smaller one is a light duty fitting for joining smaller members and is attached to each round member with a single bolt. The larger size, of similar design, is attached to round members with a single bolt for medium duty and with two bolts (one through each end) for heavy duty. Design of the fittings permits attachment to round members at any angle between 0 and 90°.

Applications include single pole, A-frame and H-frame structures, push braces and other special pur-

pose structures. In both types, all pole contacting surfaces are curved to fit a wide range of pole diameters, and have teeth and ribs to increase the loads that can be transmitted through the connections. No gaining is required, and the number of holes drilled is kept at a minimum. No special tools are needed for installation. All parts except bolts are of strong, tough malleable iron.

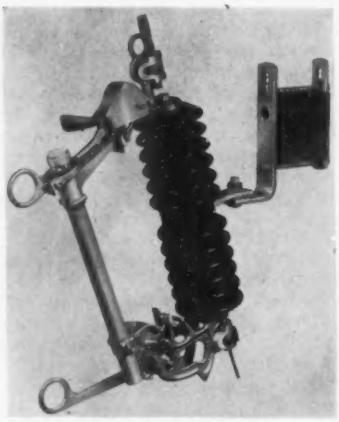
For additional data, ask for item U-906, using the coupon on page 125.

Load-break cutouts for button head links

SOUTHERN STATES Equipment Corp., of Hampton, Ga., recently announced the availability of its new load-break cutouts, the Types LBV-33-F and LSV-33-F. The new cutouts are designed for universal button head links up through 100 ampere ratings.

The LBV-33-F employs an expendable disc in the fuse holder cap. Function of this disc is to confine gases on low faults for dependable operation. Disc is expelled on high faults allowing cutout to vent at both ends of tube for high interrupting capacity.

The LSV-33-F is a single-vented cutout identical to the LBV-33-F except for solid cap which replaces cap with expendable disc.



These new cutouts are available in voltage ratings from 5-25 kv. Interrupting ratings for the LBV-33-F are as high as 8,000 rms amperes. The LSV-33-F interrupting ratings go up to 5,000 rms amperes.

For additional data, ask for item U-907, using the coupon on page 125.

Metal-enclosed switchboard units reduce wiring needs

METAL-ENCLOSED outdoor switchboard equipment has been developed by General Electric's Medium Voltage Switchgear Department, Schenectady 5, N. Y.

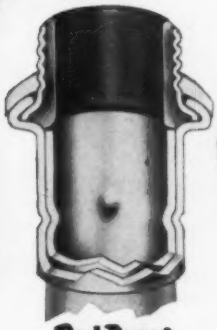
Similar in appearance to metal-clad outdoor switchgear, the new equipment eliminates need to allot control building space for switchboards and permits units to be located near the apparatus they help protect, thereby appreciably reducing the amount of wiring needed.

Space is provided at front of enclosure for protection and convenience of servicing personnel, allowing maintenance to be carried on during inclement weather. In a line of several units, side sheets are eliminated, and the space becomes a walk-through aisle. Enclosures are

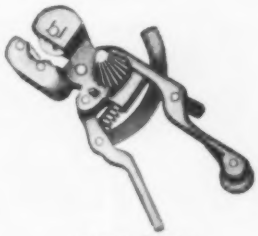
B-M

the original concrete-tight **INDENTER FITTINGS** *for E.M.T.*

Red Throat
Insulated Connector



Red Throat
Cross section



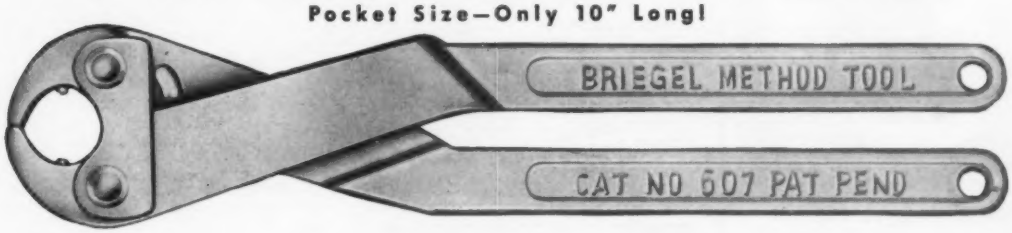
"BM" #100
Cutter for ½, ¾ and 1" E.M.T.

"BM" #1000
Holder for ½, ¾ and 1" E.M.T.

"BM" #600
Changeable Jaw Indenter

THE NEW BM607 INDENTER FOR ½" FITTINGS

Pocket Size—Only 10" Long!



FREE 30 DAY TRIAL OF THE NEW BM-607 ½" INDENTER

Your BRIEGEL Distributor has been authorized to give you a 30 DAY FREE TRIAL of the New BM-607 Indenter for ½" fittings.

This Smaller Lightweight Tool requires only half the hand pressure formerly needed to make neat deep positive grounded impressions.

Ease of action is made possible by an exclusive new Floating-Fulcrum principle that greatly increases leverage.

Try the New BM-607 Indenter Free for 30 Days. See for yourself how much lighter it is to carry—how much easier it is to use!

THIS FREE TRIAL OFFER IS LIMITED TO 30 DAYS

All B-M Indenter Fittings are U.L. Approved as concrete-tight and all Compression Fittings as rain-tight as well as for general use (File Card E10863). Also comply With Federal Specifications W-F-406.

BRIEGEL METHOD TOOL CO.

GALVA, • ILLINOIS

SOLD ONLY THROUGH ELECTRICAL WHOLESALERS

COST
no more
(THAN ORDINARY EARED BOXES)

UNION'S
"SNAP-IN"
OUTLET & SWITCH BOXES

WITH ALL THESE
TIMESAVING FEATURES

1. Quick convenient snap-in mounting.
2. No awkward metal straps needed.
3. Ears fixed in "exactly right" position.
4. Plates fit snugly everytime.

Write for literature and free samples.

UNION INSULATING CO.
PARKERSBURG, WEST VIRGINIA

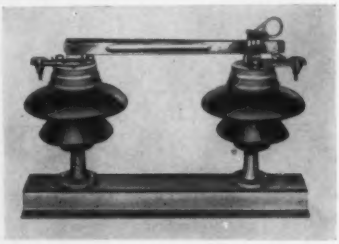
equipped with internal illumination, heaters, outlets and ventilation.

For additional data, ask for item U-908, using the coupon on page 125.

Hookstick switch mounts vertically, or is underhung

MANUFACTURE of the BTL hookstick-operated switch, available in ratings of 7.5, 15, and 23 kv at 200 amperes has been announced by the A. B. Chance Co., 210 North Allen St., Centralia, Mo.

Designed for mounting in vertical or underhung position, this economical switch is assembled on NEMA-



standard-duty insulators. Cap-and-pin and station-post insulators can be furnished, if desired.

Multi-finger jaw contacts are of hard-drawn copper and have phosphor-bronze back-up springs. Blade latch and centered contact pressure hold switch securely when in the closed position.

Pry-out action gives extra leverage for easy opening. Blade is of high-conductivity copper formed into a rigid truss to resist side-thrusts.

For additional data, ask for item U-909, using the coupon on page 125.

Panoramic pole light gives greater area of illumination

DEVELOPED for higher level illumination of parking lots, parks, amusement centers, shopping centers, etc., is the new Panoramic 4-way pole light being offered by Nepo Manufacturing Co., 4230 North Sayre Ave., Chicago, Ill.

Four luminaires are mounted on the specially designed pole on 4', 6', or 8' mast arms. With this arrangement, 8', 12' or 16' spans between light centers provide a more effective spread of illumination over a far greater area per pole than obtained with standard designs.

These pole packages furnished complete with Nepo luminaires are obtainable with rigid steel or aluminum shafts, or a specially designed steel hinged pole.

For additional data, ask for item U-910, using the coupon on page 125.

Micarta semi-buried transformer vault

THE DEVELOPMENT and availability of a Micarta (glass reinforced polyester) housing for enclosing distribution transformers in underground installations has been announced by Westinghouse Electric Corp.

The previous housings used for this purpose were made of concrete and steel and required five men and a crane to install. The Micarta housings come in two pieces with a combined weight of under 300 pounds and can be installed by just two men.

Measuring 84 inches high and 60 inches in diameter, the circular housing will accommodate any single phase distribution transformer up to 167 kva including the disconnects. By permitting the use of 167 kva transformers, more homes can be served from each housing thereby cutting down the original investment in vaults and transformers for the utility. In addition, sufficient space is provided in the housing to permit inspection and maintenance of the transformer. Access for inspection is made by opening the dome which lays back on the ground out of the way.

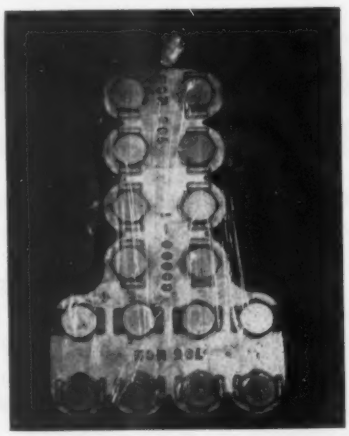
For additional data, ask for item U-911, using the coupon on page 125.

Aluminum power connectors in protective packaging

THE LINE of aluminum power connectors now being produced by the Royal Electric Manufacturing Co., Inc., of 1122 East 87th St., Chicago 19, Ill., will be packaged in individual polyethylene plastic bags.

The company states that the plastic bags are being used to prevent foreign matter from being deposited on the contact surface of the connector prior to the installation.

All contact surfaces on the new aluminum power connectors are finished with a rough grind to provide multiplicity of point contact and



then immediately coated with an oxide inhibitor to prevent the formation of the high resistance aluminum oxide film on the contact surfaces.

These aluminum power connectors save installation time and resist corrosion.

For additional data, ask for item U-912, using the coupon on page 125.

Bill Riester,

(who keeps a sharp eye on job costs),

uses Murray 100 amp equipment

I get Main and Range disconnects, a separate water heater pullout, and 8 lighting and appliance circuits out of this compact, easily wired PJ Panel, Riester says. That's good wiring practice at an economical price.

On this rewiring job we needed an additional 8 circuits for lighting and appliances. This Murray Load Center, Riester points out, does the job perfectly—has fully magnetic circuit breakers for best performance.

BILL RIESTER, Chief Engineer of Hale Electric Co., prominent Pittsburgh contractor, likes to keep a close watch on costs. This is how he does it on home rewiring jobs.

"*The profits I show at the end of the year depend on two things: how much business I did and what it cost to do it.*

"*I take care of the gross volume by trying to 'sell up' on every job I can. I concentrate on the home modernization market because competition is easier . . . and the profits are better.*

"*Next I try to guarantee those profits by working with lines I can depend on. Take service entrance, for instance—most of the time I order Murray.*

"*The equipment goes up fast and easy—so my men save time. Also, the devices are made well, built to give good service—that means no time out for callbacks. Result: lower overhead, bigger profits.*"

Find out for yourself how Bill Riester keeps his job costs down. Next time you order—say Murray. Write for Bulletin 100A.

Murray

"Quality doesn't cost . . . it pays"

murray

MANUFACTURING CORPORATION • 1250 Atlantic Ave., B'klyn 16, N.Y.

Know the law

by Arthur L. H. Street

Bad installations can prove tragic and costly

Mr. Electrical Contractor, if you have a modest business and do not carry liability insurance, do you realize that *one* bad installation made by your employee could render you insolvent, to say nothing of a tragic electrocution of one with whom you never had any business dealings? If not, you will be very much interested in what happened to a Kansas contractor, even if he was not rendered insolvent.

In fact, any electrical contractor who would be reluctant to have a $12,000 judgment awarded against him — entailing considerable additional expense for attorneys' fees and court expenses — on reading what follows should be prompted to use utmost care to guard against injuries or death to one coming in contact with any installation.

The Kansas case also demonstrates the wisdom of using extreme care in the employment of assistants, for obviously that will lessen the risk of becoming responsible to some one in damages. (But, of course, what a journeyman electrician does in the course of his employment, is, in legal effect, the act of the employer, regardless of how much care was used in hiring him.

In this case, decided January 12, 1957 (Kurdzeil v. Van Es, 306 Fed. 2d 159) an electrical contractor sent an employee to a home to wire the premises for an electric clothes dryer. That involved installation of a switch-box on a kitchen wall near a sink. Nearly five months later occupancy of the house changed; plaintiff, his wife and their three-year old son moving in. Two weeks later the boy was electrocuted by contacting the switch-box and forming a circuit when his legs touched a metal strip.

In the parents' suit for damages doctors testified that the voltage that passed through the boy's body — probably 113 to 117 volts — would electrocute a two-and-one-half year old infant.

A jury awarded $12,000 damages under a Kansas statute which permits as much as $15,000 damages to be collected for death due to carelessness. The Supreme Court approved the judgment.

The case was unsuccessfully defended on the ground that the installation was proper and that the defective condition was caused by some one else unknown to the contractor and the employee, who were sued jointly. Defendants further claimed that the parents knew, or ought to have known, of the defective condition.

Inspector testifies

The city electrical inspector testified that examination of the switch-box after the accident showed negligent installation in these particulars: (1) Four No. 10 wires had been installed into a ½ inch instead of a ¾ inch Romex cable connector, in violation of the national and city codes; (2) Four No. 10 installation wires had been installed into a hole which was too small to hold the wires, and (3) a metal box had been installed upside down on the wall and had not been grounded. He further testified that the records of his office failed to disclose a request for inspection and a permit for the installation. Tests showed that if a person touched the box on which the child's right shoulder was leaning when found, and the metal strip on which his feet and legs were touching, it would complete a circuit by grounding the box which was termed "hot", and 113 to 115 volts of electricity would pass through the body. He testified that a voltage beyond 25 would be considered deadly under the circumstances.

The inspector also testified that he found four violations of the electrical code. He observed that the insulation on one of the wires had been damaged and that the damage was at the point of contact with a half-inch Romex connector; that he found four No. 10 conductors which came through the connector, and the connector was clamped. The white conductor was pinched by the clamp so that the insulation had become impaired and an electrical contact was made by that conductor to this box so that the box itself was "hot."

Rejecting defendants' claim that the suit should be dismssed on the ground that the mother was negligent, the Supreme Court said:

"Their contention is predicated on the theory that" the mother "knew of the switch-box over the kitchen sink; that she had previously received a shock from it, and that the child had previously climbed on the table top near the sink. * * * Plaintiff testified that she had never received a shock from the switch box or the chrome strip around the table top, and had no knowledge of the defective condition of the wiring. * * * The plaintiff was in her own home, and had every reason to believe that it was safe for her and her children."

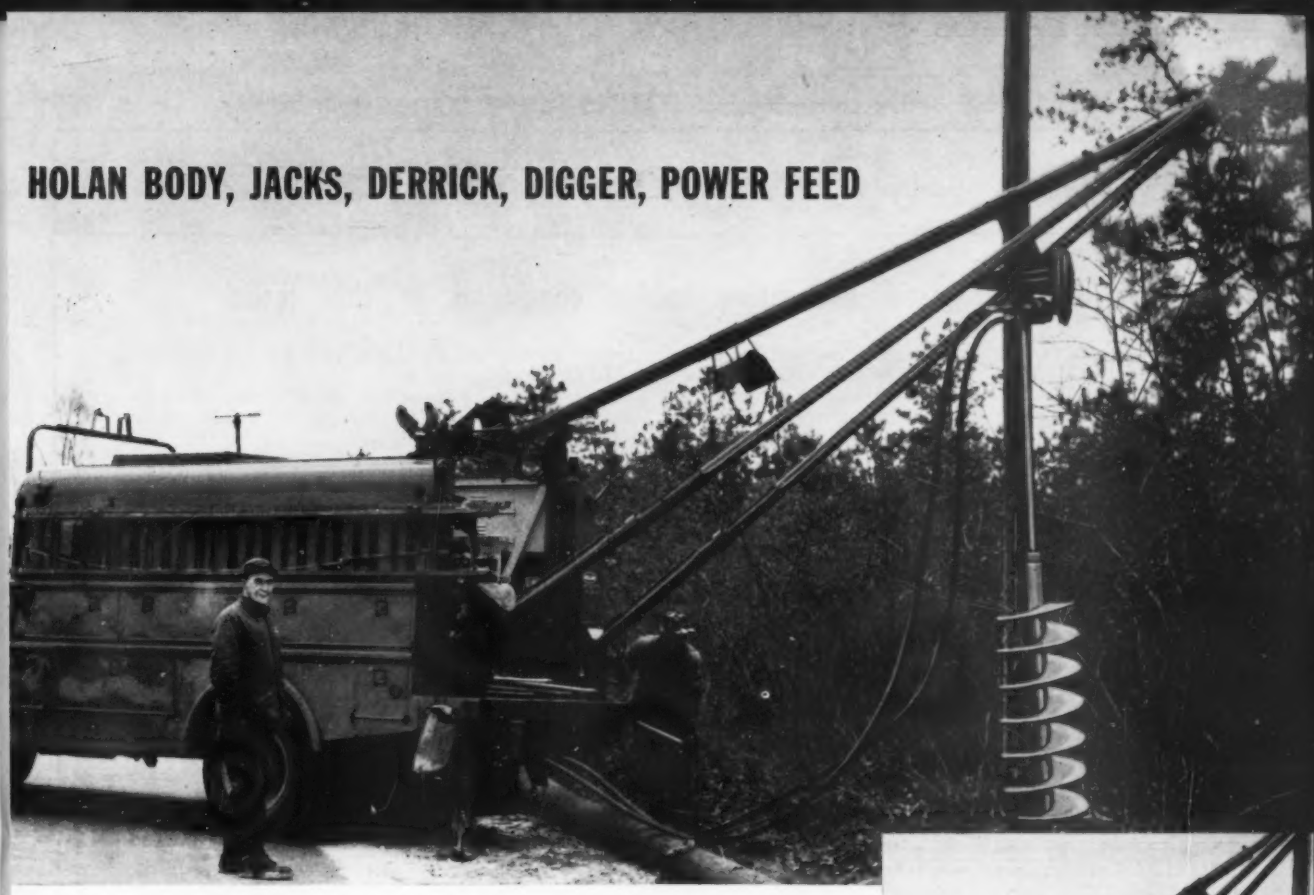
The Supreme Court rejected argument by defendants' lawyers that no damages in excess of $600 spent by the parents for funeral expenses should be allowed.

Florida decision on mechanics liens

The problem: The owners of a Florida home engaged a contractor to improve it, involving electric wiring and other work. A supply company furnished materials to the contractor, but did not give the owners notice, provided for by the mechanics lien law, that the company had a lienable claim. The owners settled with the contractor in full, not knowing of the company's claim, and without protecting themselves, as they could have done under the provisions of the lien law, by requiring the contractor to sign a sworn statement to the effect that there were no unpaid claims for materials furnished him for the job. Could the supply company enforce a lien against the property?

(Continued on page 126)

HOLAN BODY, JACKS, DERRICK, DIGGER, POWER FEED



Dig the hole . . . set the pole

The photos tell the story. This crew is equipped to handle just about any job you give it.

Body: Holan's CHC-182—big enough to carry everything and everybody you need. A 7-man crew compartment plus the usual Holan features such as high-tensile steel throughout, double-panel doors, indented compartment handles and large inside dimensions.

Jacks: Fast-acting, self-stowing, Holan hydraulic jacks move from stowed position to full extension in 8 seconds . . . return in 6 seconds.

Derrick: Holan Series 5700—a live-boom unit with hydraulic sleeve locking for side legs. 6,000-pound capacity . . . 2,000 pounds for loading into truck.

Digger: Holan 4401-H hydraulic earth borer takes the hard work out of hole-digging. Goes down smoothly, pulls up easily, shimmies off dirt.

Power Feed: New bracket-type unit fits onto middle leg . . . uses hydraulic force and weight of derrick to force digger into hard ground . . . holds digger while derrick sets pole.

In other words, whatever you need in bodies and power equipment, you can get from one source: *Holan.* Everything is made of high-tensile steel, everything is a step ahead of the field. Write for catalogs on Holan equipment.

Holan digger shimmies off dirt. Notice digger power feed and sleeve locks on derrick side legs.

Holan power feed attachments can be mounted on Series 3700 or 5700 derricks. 3700, shown here, has 12,000-pound capacity . . . has been load-tested at 22,000 pounds.

J.H. HOLAN CORPORATION

4100 WEST 150TH STREET
CLEVELAND 11, OHIO

OTHER PLANTS

HOLAN CORPORATION OF GEORGIA, Griffin, Ga. • J. H. HOLAN CORP., Phoenix Div., Arizona
BRANTFORD-HOLAN LIMITED, Brantford, Ontario

THE NAME THAT MEANS WORK SIMPLIFICATION

New, revised estimating tables continued in this issue

A NEW SERIES of estimating tables, completely revised in the light of more recent jobs and experience, are presented in this issue and will appear from month to month in forthcoming issues. These electrical estimating data sheets cover labor only and are arranged alphabetically with the basic material headings as a title for each tabulation.

Labor units given in these tabulations are based on a minimum of interference during work progress. The averages listed do not provide for abnormal job conditions, and any such abnormal conditions will require adjustments by the user, based on his experience.

The work units covered by each table are composed of one or more separate but closely related operations necessary for the complete installation of a particular basic item of electrical equipment. These operations associated with the basic material are described at the bottom of each table.

Most of the electrical estimating tabulations follow the same form. Column 1 at the left shows the size of the material to be installed. The second column from the left gives the time required to install the material, and it should be noted especially that this "productivity" column may be based on individual units or in the case of cable or conduit on units of 100 feet or 1,000 feet. The abbreviations "Ea." for each, "C" for hundreds, and "M" for thousands in Column 2 indicate the basis of the labor hours.

Columns 3 to 13, from the left, give the actual labor costs in dollars per unit of installation, at various hourly wage rates.

When calculations are being made for an hourly wage rate that doesn't correspond to any of the rates listed in Columns 3 to 13, the user may multiply the number of hours in Column 2 by 100 and this will give the labor cost based on an hourly wage rate of $1 per hour. By multiplying this by the hourly wage rate that actually applies in the user's locality, the exact labor cost of the operation may be obtained. Labor costs obtained in this way will be for units, hundreds of feet, etc., as given in heading of Column 2 of the table.

The labor units covered by the tables represent direct job labor costs and do not include delivery of material to site, engineering, estimating, or any other indirect cost.

As will be noted, some of the electrical estimating tabulations to be given will be for independent operations, such as excavating, backfilling, etc. These are included for use in preparing estimates on work of a special nature not covered under a specific table heading.

Tables will appear in alphabetical order.

CONDUIT (RIGID) PUSHING - UNDERGROUND with MANUAL PUSHER

CONDUIT SIZE	HRS. "C"	LABOR COST PER FT. @ FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
1"	12.5	.154	.195	.215	.246	.277	.308	.338	.369	.40	.431	.461
1 1/4"	15.3	.173	.209	.242	.276	.311	.345	.38	.414	.449	.483	.518
1 1/2"	15.9	.199	.259	.278	.318	.358	.398	.437	.477	.517	.557	.596
2"	18.6	.233	.279	.326	.372	.419	.465	.512	.558	.606	.651	.698
2 1/2"	23.2	.29	.348	.406	.464	.522	.58	.64	.696	.754	.812	.87

E-101-B

LABOR: Includes cutting and threading conduit in 5 ft. lengths, assembling and pushing with a manual pusher. (Leaver and notched steel rail)

9-57

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Electrical South Data Sheets — Series III — Electrical Estimating

high bay fluorescent

Specially Designed

FOR GE POWER GROOVE LAMPS

TESTED AND APPROVED BY
UNDERWRITERS' LABORATORIES

POWER GROOVE INDUSTRIALIST

PORCELAIN ENAMELED

ANOTHER ALL-BRITE FIRST!

INCLUDES THESE OUTSTANDING *PLUS* FEATURES

High output—2½ times that of conventional equipment.

15° transverse shielding.

20% upward light—Reduced brightness ratios.

Parabolic shield-reflector.

Adequate ballast ventilation—Longer ballast life, more efficient operation.

Lamp ventilation—Optimum lamp life.

Heavy duty fully metal clad sockets—Rigid sockets provide accurate alignment of lamps.

9½" lamp centers.

Clincher back case—Sliding tong hanger.

Oakite Cryscoat—Highest resistant prepaint treatment.

MILTON C. VERY
District Sales Manager
Southwest and Gulf States
FLUORESCENT FIXTURES OF CALIFORNIA

"Let us help you solve your Lighting Problems"

All-Brite
LIGHT OF THE WEST

fluorescent fixtures of california

352 SHAW ROAD • SOUTH SAN FRANCISCO

SOUTHWEST DISTRICT OFFICE: 717 LATIMER ST., DALLAS
GULF DISTRICT OFFICE: 1702 CULLEN BLVD., HOUSTON

Conduit, Pushing — UNDERGROUND with HYDRAULIC PRESSURE

ITEM	HRS "C"	LABOR COST PER FT. @ FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
3/4"												
1"	11.2	.14	.168	.196	.224	.251	.28	.308	.336	.364	.392	.42
1 1/4"	12.5	.156	.188	.219	.25	.281	.313	.344	.375	.406	.438	.469
1 1/2"	14.4	.18	.216	.252	.288	.324	.36	.396	.432	.468	.504	.54
2"	15.6	.195	.234	.273	.312	.351	.39	.429	.468	.507	.546	.583
2 1/2"	16.9	.211	.254	.296	.338	.38	.421	.465	.507	.549	.592	.634
3"	18.5	.231	.278	.324	.37	.416	.463	.509	.555	.601	.648	.694
3 1/2"	20.	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
4"	22.5	.281	.338	.394	.45	.506	.563	.619	.675	.731	.788	.844

E-101-B

LABOR: Includes setting up pusher, cutting and threading conduit & pushing conduit.

9-57

CLAY CONDUIT - SINGLE DUCTS - STANDARD LENGTHS

SIZE BORE	HRS. PER FOOT	LABOR COST PER FOOT @ FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
3 1/2 R	.1	.125	.15	.175	.20	.225	.25	.275	.30	.325	.35	.375
3 1/2 R	.1	.125	.15	.175	.20	.225	.25	.275	.30	.325	.35	.375
4 1/2 R	.15	.188	.225	.263	.30	.338	.375	.413	.45	.488	.525	.563
5 1/2 R	.15	.188	.225	.263	.30	.338	.375	.413	.45	.488	.525	.563
3 1/2 Sq.	.1	.125	.15	.175	.20	.225	.25	.275	.30	.325	.35	.375
3 1/2 Sq.	.1	.125	.15	.175	.20	.225	.25	.275	.30	.325	.35	.375
4 1/2 Sq.	.15	.188	.225	.263	.30	.338	.375	.413	.45	.488	.525	.563

SINGLE DUCT BENDS

BORE	RAD	PER EACH										
3 1/2	12"	.15	.188	.225	.263	.30	.338	.375	.413	.45	.488	.525	
3 1/2	18"	.15	.188	.225	.263	.30	.338	.375	.413	.45	.488	.525	
3 1/2	24"	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	
3 1/2	36"	.25	.313	.375	.438	.50	.563	.625	.688	.75	.813	.875	
3 1/2	18"	.15	.188	.225	.263	.30	.338	.375	.413	.45	.488	.525	
3 1/2	24"	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	
4 1/2	36"	.3	.375	.45	.525	.60	.675	.75	.825	.90	.975	1.05	1.13
3 1/2	36"	.25	.313	.375	.438	.50	.563	.625	.688	.75	.813	.875	.938
4 1/2	18"	.2	.25	.375	.35	.40	.45	.50	.55	.60	.65	.70	.75
4 1/2	24"	.25	.313	.45	.438	.50	.563	.625	.688	.75	.813	.875	.938

E-102-B

LABOR: Includes preparation, laying, aligning, sealing joints.

9-57

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ALLIS-CHALMERS

"F Z O" frame-type breaker

Has 3 Features You Want Most!

HERE are the outstanding features utilities enjoy with this Allis-Chalmers frame-type breaker.

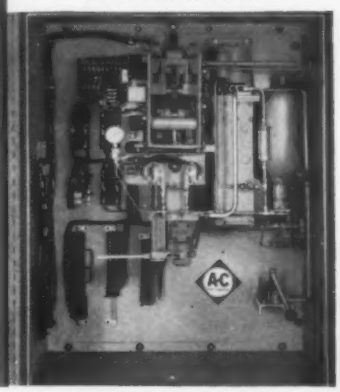
Pneu-Draulic **operator provides last word in simplicity — ease of inspection — reliability.**

Power-operated hydraulic tank lifter takes all the effort out of raising and lowering tanks — saves time.

Turbo-Ruptor **interrupting device with self-aligning tulip and bayonet contacts.**

In addition, there are dozens of refinements, such as the side trip . . . new oil sampling device . . . float-type oil gauge . . . external adjustment of overtravel stop . . . ASA standard bushings . . . which make this the finest breaker in the field.

Power-operated hydraulic tank lifter.



Pneu-Draulic operator.

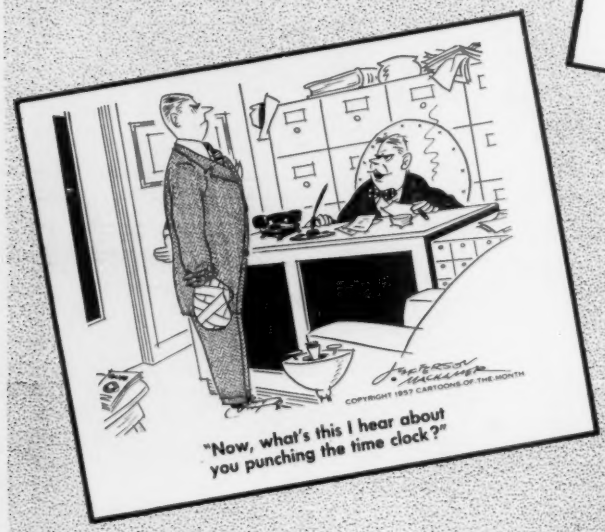
For complete details, call your nearby Allis-Chalmers office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Pneu-Draulic and *Turbo-Ruptor* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

A-5417

Your Work Can Wait!



"Now, what's this I hear about you punching the time clock?"

"Get it out of here! I don't care if it is where we first courted!"

"I dread the thought of a four day week, also!"

"These new fathers slay me!"

ADVANTAGES OF 16-STEP OPERATION NOW AVAILABLE ON 3-PHASE URS STATION-TYPE REGULATORS

In addition to the advantages of 16-step operation, URS regulators provide long, trouble-free life through • MAGAMP—completely static control • 20-year warranted contacts • Separate oil compartment for tap changer • Shock-free, direct drive Geneva gear mechanism prevents loosening parts • Concentric lead or six bushing construction optional.

A new selector switch, mounted on the panel of 3-phase URS regulators, permits selection of ⅝% step operation; or 1¼% step operation, where out-of-step or similar paralleling with ⅝% step is not required. Similar units may be paralleled on 1¼% steps.

Selection of 1¼% step regulation, by forcing two-step operation of the high speed response mechanism on the URS regulator, *provides benefits of 1¼% step regulation* — holds closer to set balance voltage.

The selector will be furnished on any new 3-phase URS regulator, without charge, if specified on the order.

Conversion of your present URS regulators for 16-step operation can be achieved at small cost.

For further information, contact your Westinghouse representative, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70826

YOU CAN BE SURE...IF IT'S Westinghouse

News of the industry

edited for Southern readers

"Industry Coordination" is NECA meeting theme

HOW TO BRING about genuine, practical and effective teamwork between all elements in the construction and electrical industries will be the target for the 56th Anniversary Convention of the National Electrical Contractors Association to be held in Cincinnati the week of November 10.

NECA Executive Vice-President Paul M. Geary has announced "Industry Coordination" as the theme of the meeting, which will bring approximately 2,500 electrical contractors and their guests to Cincinnati.

The convention actually starts on Nov. 11 when the NECA Board of Governors assembles for a two-day session. Prior to that the executive committee will be in session on Nov. 7-8-9. The general membership meetings, which are open to the public and guests, will start Wednesday morning, Nov. 13, and continue in the mornings through Nov. 14, 15 and 16. The business sessions will conclude at noon Saturday and the convention ends Saturday evening with the annual banquet.

The official welcoming party, opening the convention festivities, will be Tuesday evening, Nov. 12, at which time the Third National Electrical Exposition will open. All sessions of the convention and the exposition will be in Cincinnati's famous Music Hall, home of the Cincinnati Symphony Orchestra.

The exposition will be the largest electrical product and tool show ever staged, NECA officials report. Electrical manufacturers plan to present a wide variety of new products and applications at this show and many plan to make their booths consultation and conference headquarters for application engineering advice.

Convention Manager Clint J. Harder has arranged a full program of entertainment and sightseeing which will be climaxed by the annual banquet Saturday evening.

Business sessions will be of the panel and graphic and skit presentation type which have proved so popular in recent years both at the national conventions and the district meetings. Only two major addresses will be presented. One will be the annual address of President Oliver F. Burnett and the other an address by a leader in the industry whose identity will be revealed later.

Headquarters of the convention will be at the Music Hall. There is no officially designated headquarters hotel.

UNDERGROUND SYSTEMS—Discussing some of the technical aspects of the Underground Systems Reference Book recently published by Edison Electric Institute are, from left, (seated) James A. Pulsford, editor-in-chief of the book, and J. Wesley McAfee, vice-president of EEI. Interested listeners are (standing) William M. Penney, chairman of the EEI transmission and distribution committee; Edwin Vennard, EEI vice-president and managing director; and Donald S. Kennedy, president of EEI. (See book review section elsewhere in this issue.)

Wiring Bureau name changed

THE National Adequate Wiring Bureau will be known in the future as "The National Wiring Bureau." This announcement was made by Carl T. Bremicker, Chairman of the Bureau, following a unanimous vote of the Executive Committee in favor of dropping the word "Adequate" from the Bureau's name. When announcing the change, Mr. Bremicker emphasized the following:

The scope of the Bureau's program will not change. It will continue to be devoted entirely to the *promotion of sufficient wiring* to permit full use of electricity in residential, commercial and institutional buildings.

As in the past, the Bureau will continue to maintain a strictly neutral position with regard to the relative merits of specific wiring materials or methods, leaving such matters in hands of local and national Electrical Code authorities.

In changing the name of the Bureau itself, it is not intended to impose a similar change upon local Bureaus. Where the word "Adequate" appears in the name of a local Bureau, any decision to retain or omit it will be left entirely to the local organization itself.

No change is contemplated in the Wiring Certification program, nor in the official Certification emblem. It will continue to read "Adequate Wiring - Certified." Many utilities, electrical leagues and local adequate wiring committees have invested substantial sums over the years to publicize and popularize the certification program and the certification emblem in their own communities. This makes it inadvisable to consider any change in this phase of the National Wiring Bureau's program.

DURO...the only complete line of Set Screw Fittings*

DURO
Specially designed cutter reams both inside and outside of metal tube at same time.
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U. S. PAT. NO. 2,797,420
Self centering screw driver speeds work . . . reduces accidents.
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handy 3 in 1 TOOL

COMBINATION NON-SLIP SCREWDRIVER AND INSIDE-OUTSIDE EMT CHAMFERRING TOOL

Fits all brands of EMT Set Screws . . .
Terrific in hard to get places . . .
electrical panels . . . many other uses.

ONLY* DURO *SET SCREW FITTINGS HAVE ALL THESE GREAT FEATURES

Every size thru 2"

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All sizes INSULATED FITTINGS thru 2"

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Complete range of Offset Fittings

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Each fitting is fully threaded and carefully sized. All have large, pan head staked screws that back off clear without breaking stake.

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*ALL STEEL FITTINGS

Similarly, the companion emblem which is available for general use (with or without the Certification program) which now reads "Adequate Wiring Serves and Saves" also will continue to be used.

The National Wiring Bureau's Executive Committee hopes and expects that this change in its name will help to bring about full cooperation with the program from all segments of the electrical industry.

Contractor's wiring sales stimulated by contest

ENCOURAGING RESULTS in breaking up wiring bottlenecks have been reported in a "Housepower Contest" conducted by Virginia Electric and Power Co.

In Vepco's northern Virginia Potomac District, for example, 21 of 29 participating electrical contractors sold 143 rewiring jobs as a result of the Housepower Ratings they made in the contest period.

One contractor made 35 ratings and clinched 25 rewiring jobs. Another turned 20 ratings into 18 rewiring sales! Still another converted 30 contest rating calls into 22 home rewiring sales!

Similar sales results have been reported throughout the area. W. L. Wachter, Inc., of Richmond, reported 8 wiring jobs for immediate installation as a result of Contest Housepower ratings. G. W. Gilmer, of Richmond's Gilmer Electric Co., came into the contest at the half-way mark. He sold 7 wiring jobs immediately, and gained a back log of prospects for future sales. Both Bishop Electric Co. and Schermerhorn Electric Co., of Richmond, have the same story to tell: 8 immediate wiring jobs plus a large back log of future business because of the contest.

In Newport News, L. R. "Bob" Norris reported 19 rewiring jobs following Housepower Contest ratings. And Swing & Price, in Hampton, who processed 18 contest entries, credit 15 rewiring jobs to the Housepower ratings.

In Fredericksburg, E. "Ben" Rosenberger made 26 Housepower ratings in the course of the contest and credits 10 rewiring jobs as a result.

Burndy demonstrates connection methods

UTILITY and industrial-plant electrical personnel will get a close-up view of the latest connection techniques when they are visited in the near future by one of the new traveling display-demonstration units put on the road by the Burndy Corp., Norwalk, Conn.

Mobile displays let Burndy representatives bring their latest in electrical connections to utility and industrial plant electrical personnel.

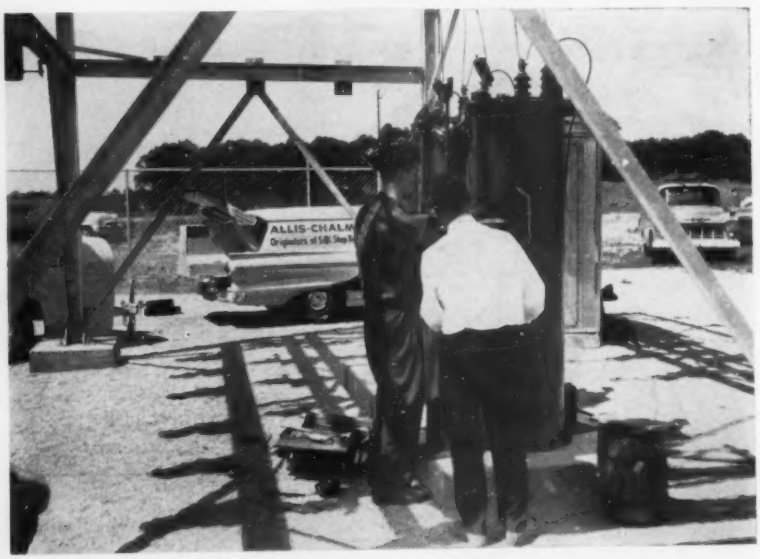
The units are station wagons specially fitted to display and demonstrate connectors and tools. Each of the company's 43 representatives will have use of one of the vehicles for three or four weeks for an intensive schedule of demonstrations.

Progress in connecting aluminum, including a new single-sleeve full-tension splice for ACSR, and "Stripsealed" clamp and C-type connectors pre-filled with joint compound will be shown by the traveling units. Other developments include a line of compact, easily installed connectors especially engineered for tapping aluminum or copper cabled secondary.

Preventive maintenance of regulators planned

A NEWLY DESIGNED field service vehicle and trailer operated by Allis-Chalmers regional service staffs has begun a planned tour of regulator installations.

Purpose of the tour is to carry



Preventive maintenance inspection of regulators in the field is now being made by regional service teams of Allis-Chalmers.

MEN RESPONSIBLE FOR

POWER DISTRIBUTION KNOW...

IF IT'S PARANITE IT'S RIGHT!®

FROM POWER CABLE TO FIXTURE WIRE...

Paranite has earned an unquestioned reputation for quality wire products and dependable service! Such well known products as Paranite PARAFLEX® non-metallic white sheathed cable and PARASYN® small diameter building wire have become "tools of the trade" with experienced contractors everywhere! On your next installation ::: specify PARANITE® for a wire of proven performance.

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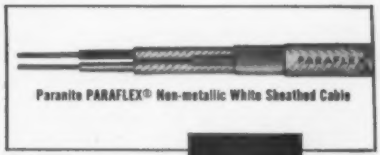

Paranite PARAFLEX® Non-metallic White Sheathed Cable

PARANITE WIRE AND CABLE

DIVISION ESSEX WIRE CORPORATION

Factory: Birmingham, Alabama

WAREHOUSES* AND SALES OFFICES

*ALABAMA, BIRMINGHAM, 2901 35th Avenue, North; TENNESSEE, MEMPHIS, 4880 Kaye Road; TEXAS, DALLAS, 1919 Levee Street

out preventive maintenance on feeder voltage regulators and to teach on the spot preventive maintenance procedures to feeder voltage regulator users.

The truck-trailer unit is fully equipped with component parts of regulators for immediate installation where required along with necessary hand tools, metering equipment, dielectric tester, meger, voltmeters, etc. A filter press is mounted in the trailer unit with oil storage tank and pumping equipment for oil handling.

The new truck-trailer is a culmination of ideas and methods devised by Allis-Chalmers service engineers who have conducted preventive maintenance programs for a number of years.

Crouse-Hinds gets new shipping center

TO FASTER and more efficiently service its distributors of cast electrical conduit fittings, the Crouse-Hinds Co., of Syracuse, N. Y., has just completed a $1,300,000 warehouse and shipping center which provides 128,000 square feet of floor space.

The new facility has introduced features which make for more efficient and speedier material handling. Much time is saved due to reduction of paper work. Checking of items before packing is simplified because of new order sheets, and pre-cut stencil labels also cut time at the packing area.

Heart of the new operation is the unit load system. Items are now packed in quantity at assembly, and box sizes have been made uniform. Especially fast moving items are located close to the receiving area to reduce forklift truck traffic. Some products are pre-packaged for volume shipment.

Products are brought into the warehouse in open-end pallet crates and are placed in specified steel racks. With this compact system, more than 10,000 different items in varying quantities can be stored in crates on the racks. The four-tier racks are eleven feet high and are spaced twelve feet apart to allow forklift trucks to move freely.

Running between these rows of racks on an overhead track is a 1400-foot dray line. Steel carts are hooked into the line at 20-foot intervals and are unhooked at desired places for filling of orders. Each cart has a compartment for orders and shipping papers and a blackboard to denote needed items. When an order has been completed, the cart is rehooked and continues on to the packing area.

Individual packing stations have scales, inclined writing desk and steel storage for excelsior and shipping cartons. Completed orders are put on a roller conveyor which leads to the shipping dock. A large turn-around area at the dock facilitates easy manipulation of tractor trailers.

Forklifts distribute electrical condulets, unit loaded in open-end crates, to designated locations in four-tiered metal racks at Crouse-Hinds new warehouse and shipping center in Syracuse, N. Y.

Dragline trucks, their order pick-ups complete, are routed to packing area above. Each packer has scales, desk, carton and excelsior storage compartment, and conveyor in-feed to main belt conveyor. The unit load system cuts order delivery span by twenty-four hours.

Hubbard announces research facilities

PLANS TO ESTABLISH a new and extensive research and development center in the Chicago area involving an expenditure in excess of $1,000,000 has been announced by Hubbard and Company, manufacturers of pole line hardware and electrical protective equipment.

Complete facilities to reproduce and evaluate conditions encountered in utility system operations and construction will be integrated on the seven-acre site which will accommodate both electrical and mechanical laboratories. The complete high voltage laboratory equipment recently purchased by the company from Purdue Uni-

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Lighting Fixtures

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Receptacles

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APPLETON

Explosion-Proof Equipment ®

Line Starter Unilets

Circuit Breaker Unilets

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APPLETON means the convenience of single source buying and the satisfaction of maximum system safety to industry all over the world. APPLETON simplifies your purchasing and specification problems by offering the widest range of quality explosion-proof equipment on the market. Rigorous laboratory and field tests assure you that the safety standards of your entire APPLETON equipment system are at their highest. Now, as never before, you can plan more efficiently, more economically, using APPLETON as your single source for industry's most advanced line of explosion-proof equipment.

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APPLETON ELECTRIC PRODUCTS ®

Industrial Lighting

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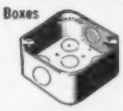

Also Manufacturers of:

"ST" Series Connectors

Malleable Iron Unilets & Covers

Reelites

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versity will be installed in the new research center.

Virtually every type of transient over-voltage and over-current disturbance on an actual system can be duplicated and its effect on distribution equipment and systems can be accurately analyzed. An outdoor area will be provided for comprehensive outdoor electrical and mechanical tests.

Kentucky plant expanded by Thomas Industries

THOMAS INDUSTRIES, Inc., Louisville, has announced that a 20,000 square foot addition is underway at the Hopkinsville, Kentucky, plant. The addition is expected to be completed in September. Also, at Los Angeles, California, a 25,000 square foot addition is scheduled for completion in August.

Mr. R. D. Burns, Sr., executive vice-president, Thomas Industries, said the space will be used for both production and warehousing of the company's lighting fixture lines. The Hopkinsville plant was opened in August, 1955, and is one of the company's key plants manufacturing Moe Light residential and commercial lighting fixtures. The Los

Dates Ahead

Illuminating Engineering Society, National Technical Conference, Biltmore Hotel, Atlanta, Ga., Sept. 9-13.

Southeastern Electric Exchange, Engineering and Operation Section, Atlanta Biltmore Hotel, Sept. 19-20.

National Rural Electric Cooperative Assn., Region VIII, Jung Hotel, New Orleans, La., Sept. 19-20, 1957.

Public Utilities Assn. of the Virginias, 39th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., Sept. 20-21, 1957.

Industrial Electronics Conference, 6th Annual Symposium, Morrison Hotel, Chicago, Ill., Sept. 24-25, 1957.

Edison Electric Institute, Meter and Service Committee, Hotel Nicolet, Minneapolis Minn., Sept. 24-26, 1957.

Edison Electric Institute, Electrical Systems and Equipment Committee, Cosmopolitan Hotel, Denver, Col., Sept. 30-Oct. 1, 1957.

National Assn. of Corrosion Engineers, South Central Region Meeting, Oklahoma City, Okla., Oct. 1-4, 1957.

International Assn. of Electrical Leagues, Annual Conference, Sheraton-Gibson Hotel, Cincinnati, Ohio, Oct. 2-5, 1957.

American Institute of Electrical Engineers, Fall General Meeting, Chicago, Ill., Oct. 7-11.

National Rural Electric Cooperative Assn., Region III, Admiral Semmes Hotel, Mobile, Ala., Oct. 13-14, 1957.

Southern Section, IAEI, Annual Meeting, Dinkler Plaza Hotel, Atlanta, Ga., Oct. 14-16, 1957.

Georgia Chapter, IAEI, Annual Meeting to be held with Southern Section Annual Meeting, Dinkler Plaza Hotel, Atlanta, Ga., Oct. 14-16. Business session 4:30 p.m., Oct. 14.

Southeastern Electric Exchange, Sales Conference, Tutwiler Hotel, Birmingham, Ala., Oct. 16-18.

National Rural Electric Cooperative Assn., Region II, Henry Grady Hotel, Atlanta, Ga., Oct. 17-18, 1957.

Florida Assn. of Electrical Contractors, Annual Convention and Trade Show, Soreno Hotel, St. Petersburg, Fla., Oct. 16-19, 1957.

Edison Electric Institute, Transmission and Distribution Committee, Statler Hotel, Boston, Mass., Oct. 17-18, 1957.

Oklahoma Utilities Assn., Electric Light and Power Division, Western District Conference, Woodward, Okla., Oct. 24, 1957. Eastern District Conference, Bartlesville, Okla., Oct. 25, 1957.

Tenth Annual Power Distribution Conference, University of Texas, Austin, Texas, Oct. 28-30, 1957.

National Rural Electric Cooperative Assn., Region X, Baker Hotel, Dallas, Tex., Nov. 7-8, 1957.

Institute of Radio Engineers, Annual Instrumentation Conference and Exhibit, Biltmore Hotel, Atlanta, Ga., Nov. 11-13, 1957.

National Electrical Manufacturers Assn., Annual Meeting, Traymore Hotel, Atlantic City, N. J., Nov. 11-15, 1957.

National Electrical Contractors Assn., Annual Convention, Cincinnati, Ohio, Nov. 13-16.

American Institute of Electrical Engineers, Sixth Annual Textile Applications Conference, North Carolina State College, Raleigh, Nov. 14-15, 1957.

Southeastern Electrical Wholesalers Assn., 8th Annual Industry Day Meeting, Biltmore Hotel, Atlanta, Ga., Jan. 29-31, 1958. M. L. Tice, Exec. Vice-Pres., P. O. Box 176, Ben Hill Station, Atlanta 11, Ga.

American Institute of Electrical Engineers, Winter General Meeting, Hotel Statler, New York, N. Y., Feb. 2-7, 1958.

Oklahoma Utilities Association, Annual Convention, Biltmore Hotel, Oklahoma City, March 27-28, 1958.

American Institute of Electrical Engineers, Southwest District Meeting, Tulsa, Okla., March 31-April 2, 1958.

American Institute of Electrical Engineers, Middle Eastern District Meeting, Washington, D. C., April 28-30, 1958.

American Institute of Electrical Engineers, East Central District Meeting, Huntington, W. Virginia, May 13-15, 1958.

DECIDEDLY BETTER
DAY-BRITE
Lighting Fixtures

Electrical contractors Cal Gilbert and Harry Becker of Gilbert & Stearns, Santa Ana, California

"True alignment . . . greater savings"

For over 30 years we've been looking for ways to do jobs better with simpler and less expensive methods. It wasn't until our first Day-Brite job that we really had something to talk about.

"Day-Brite 'A-J' hangers showed us how much time we could actually save on installation. Fixture runs of more than 200 feet finished out with true alignment and considerable savings on labor.

"Day-Brite packing is so complete that extra on-the-job assembly is eliminated. The excellent finish on Day-Brite fixtures reduces to a minimum the scratches, chipping and peeling we usually experience with other units.

"Yes, we're great Day-Brite boosters. On every lighting job we engineer, these are the fixtures we specify and use!"

It's hard to top enthusiasm like Mr. Becker's! Like to feel that way about a fixture, yourself? Specify Day-Brite and see.

Certified Lighting for a Better America

DAY-BRITE LIGHTING, INC.,
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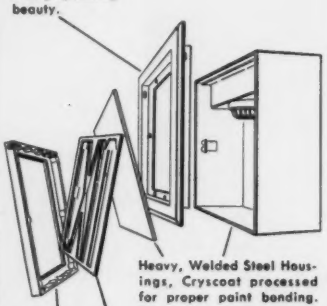
NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

FOR EXIT LIGHTING

PRESCOLITE IS PREFERRED

HERE'S WHY...

"Dielux" Diecast Frames precision made for strength, lasting beauty.



Heavy, Welded Steel Housings, Cryscoat processed for proper paint bonding.

Die cut Metal Letter Stencils.

Unbreakable Fiberglas Lens Panels—6 color combinations.

Diecast Frame Inner Section with concealed hinge swings out for easy access to interior.

These features and many others make PRESCOLITE Exit Lights the finest on the market today.

R-50 RECESSED EXIT

P-54-L PENDANT MOUNT EXIT ARROW TO LEFT

ST-55-D TRIANGULAR WALL MOUNT EXIT WITH DOUBLE ARROWS

Write for your copy of catalog on complete line of PRESCOLITE Lighting Fixtures.

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2229 4th St., Berkeley 10, Calif.
Easton Road, Neshaminy, Penna.

B. M. Byers, president of A. M. Byers Co., and W. C. Robinson, Jr., president of National Electric Products Corp., sign agreement granting National Electric sole processing and marketing rights for Byers' wrought iron electrical conduit. Witnessing the transaction are (standing left to right) H. R. Rowland, vice-president of sales for A. M. Byers Co., R. C. Bennett, Jr., general vice-president of National Electric and L. D. Shank, National's general sales manager.

Angeles plant includes one of the industry's most modern lighting fixture showrooms in addition to manufacturing and warehousing facilities. The plant was opened in December 1955.

National Electric will market Byers' conduit

NATIONAL ELECTRIC Products Corporation has been granted exclusive finishing and marketing rights to A. M. Byers Company's UL approved wrought iron electrical conduit.

National Electric will market the corrosion resistant conduit through its eleven warehouses, 29 district offices and authorized distributors located throughout the United States.

With the addition of wrought iron electrical conduit, National expands its established product line which includes: Sherarduct, Superduct, Economy and Xduct rigid steel conduit and Xduct Junior electrical metallic tubing.

The wrought iron conduit will be processed by National to conform to specifications approved by the Underwriters' Laboratories on August 16, 1956. A specially developed vinyl plastic coating will be applied to an evenly distributed, highly concentrated galvanized finish. The conduit will be distributed in ten-foot lengths in a range of standard sizes from ¾ inch to six inches.

Despite its comparatively recent approval by Underwriters' Laboratories Incorporated, A. M. Byers Company's unique corrosion resistant wrought iron pipe has been used as electrical conduit in rugged out-of-doors service for more than fifty years. It has been consistently specified by railroads, highway departments, and municipal engineering authorities—especially in areas of service where UL approval was not a factor and where the threat of corrosion constitutes a major problem.

Live Better Electrically announces fall campaign

TO BRING the concept of electrical living closer to the market place and to enlarge the market for new as well as more electrical products are the major objectives of the Live Better Electrically "Fall Push" program.

Live Better Electrically is the slogan of the electrical industry's nation-wide long-range market development program. It is spearheaded by over three hundred electric utilities within their individual service areas. Live Better Electrically conducts a national advertising and public relations program to provide a unified backdrop for concentrated, coordinated action by the entire electrical industry to gain a greater share of the consumer dollar.

In addition to the regular Live

Better Electrically Advertising schedule, many leading publications are planning special electrical living editorial sections.

Similar to the Spring campaign, the consumer advertising program will feature ads in leading magazines designed to sell the benefits of electrical living in a way that will help place appliances back on the "most wanted" list.

Electrical appliance manufacturers with national television shows will run commercials on their programs. Live Better Electrically commercials once a month on Ronald Reagan's dramatic weekly show on Sunday nights, carried by 155 CBS-TV stations, will reach a coast-to-coast audience of some 40 million people. "Studio One" dramatic show on Monday nights also will devote commercial time to the ease and pleasure of electrical living.

For local radio and TV use by utilities, dealers and other trade allies, a new assortment of Live Better Electrically commercials are available. These open-end, filmed commercials, scripts and recordings promote the concept of electrical living generally, as well as specific product advantages. The appliances featured tie in with the EEI Calendar promotions.

Specially designed Live Better Electrically promotion kits for use by trade allies are available for local programs. These kits contain ideas and materials which can be used by retailers, builders and contractors to help them put on their own Live Better Electrically merchandising programs.

A Fall Press Kit will give support to publicity efforts of local trade allies and electric utilities. The kits contain feature stories on various aspects of electrical living, suggested radio scripts and glossy photos.

Two Live Better Electrically full color motion pictures "Meet Mrs. Swenson," and "Something Wonderful Happens" also will be made available for showing by local trade allies to various women's service clubs and other civic and social organizations.

The consumer booklet has been revised to include up-to-date developments new products brought about in electrical living. Featuring a new cover, the title of the booklet was shortened to "Ideas to Help You Live Better Electrically."

A six-page newspaper supplement will enable newspapers to build profitable editorial and advertising sections and special editions. Released to the nation's newspapers through Publishers' Auxiliary, the Live Better Electrically supplement will carry three pages of editorial material and three pages of suggested newspaper promotion and advertising.

IT PAYS TO HAVE HUBBELL GOOD CONNECTIONS

the first and only

GROUNDING

Twist-Lock®

3-WIRE, 15 AMP. 125 VOLT

Here is the "Twist-Lock" equivalent of the 5262 Line of Straight Blade Grounding Devices.

CAT. NO. 4730
Connector Body

A COMPLETE NEW LINE . . .

NON-INTERCHANGEABLE

WITH REGULAR "TWIST-LOCK"

NOTE THE SPECIAL ELBOW-SHAPED GROUNDING SLOT.

These new 4700 Series Grounded "Twist-Lock" units are polarized to prevent interchange with regular 125-volt "Twist-Lock" devices. An elbow-shaped grounding slot prevents insertion of regular "Twist-Lock" caps, accepting 4700 Series caps only. With 4700 Series "Twist-Lock" units there is absolutely no danger of plugging into a 3-phase circuit by accident.

Write today, for complete information.

HARVEY HUBBELL, INC.

HIGHEST QUALITY
WIRING DEVICES • MACHINE SCREWS

DEPT. R-2 BRIDGEPORT 2, CONNECTICUT

WIRING DEVICE WAREHOUSE LOCATIONS ASSURE NATIONWIDE STOCK AVAILABILITY

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TITAN TOPS
the High Wattage Market!

TITAN
Completely Automatic, Portable
HI-WATT HEATERS
for faster sales, bigger profits!
featuring:

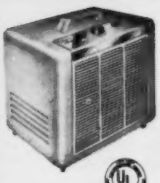
- HI-HEAT
- HI-QUALITY and
- HI-STYLE
- LOW, LOW PRICE

Plus NATIONAL ADVERTISING that pre-sells your customers!

The ONLY high-wattage heaters with
UNCONDITIONAL 10-YEAR GUARANTEE
of heating elements

- automatic thermostat
- automatic temp-limit control
- automatic safety shut-off

and many other deluxe features
3000 watt, 4000 watt & 4600 watt models



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a totally new appliance
TITAN HI-V CONVERTIBLE
HEATS in Winter
COOLS in Summer

STOCK . . . FEATURE . . . SELL
the nationally advertised
TITAN LINE!

Write for full details on TITAN Hi-Watt Heaters, Titan Hi-V Convertible and the rest of the fast-selling Titan line of thermostatically controlled convection and radiant-convection heaters.

TITAN SALES CORP.
BUFFALO 10, N. Y.

News about people

V. H. Braunig O. W. Sommers Harold Tynan Murray Jolly

FOLLOWING the loss through retirement of forty-four key employees at the **City Public Service Board,** San Antonio, Texas, several new appointments have been made at the top management level. **V. H. Braunig** still serves as general manager.

O. W. Sommers, former executive assistant, was named to the new position of assistant general manager.

J. E. Sheehan was appointed staff engineer.

Harold Tynan, formerly superintendent of transmission and distribution, was named manager of the electric system, to succeed **R. J. Foley** who recently resigned to accept another position.

Tom Deely, formerly staff engineer in the executive department, was named manager of the commercial department to succeed **Roy E. Sivley.**

The electric system will now be made up of three integral parts: the distribution department under **Murray Jolly,** who had been Mr. Tynan's assistant in distribution and transmission; the engineering department under **C. G. Krause;** and the power department under **Milton Zimmerman.** These three men will be known as managers of their respective departments.

Jacques P. Rhodes has been appointed purchasing agent of **Pennsylvania Transformer Division,** McGraw-Edison Company. Mr. Rhodes succeeds **Mrs. Lucy K. Packard,** who has retired after serving as purchasing agent for eighteen years.

George C. Billock, vice-president and treasurer of **Hubbard and Company,** has been appointed to a newly created position of vice-president and assistant to the president.

Mr. Billock is a graduate of the University of Pittsburgh and attended Duquesne University Law School. He joined Hubbard and Company in 1955 and was previously associated with Latrobe Steel Company and National Steel Corp.

Marshall S. Delavan has been elected vice-president and treasurer. He is a certified public accountant and a graduate of New York University, He was formerly associated with Alexander Smith, Inc., Burlington Mills and Textron, Inc.

John D. Simpson has been elected treasurer of **National Electric Products Corporation,** Pittsburgh, it was recently announced by W. C. Robinson, Jr., president of the firm. He succeeds John L. Auch who resigned due to illness.

Mr. Simpson is a graduate of Lafayette College and was most recently associated with Economics Laboratory, Inc., as treasurer and chief financial officer.

Harry T. Bussmann, vice-president of the **Bussmann Manufacturing Co.,** of St. Louis, passed away on August 7.

Long active in the electrical industry, Mr. Bussmann had served as president of the Electrical Board of Trade in St. Louis, and was section chairman of NEMA and served on its board of governors.

James Leroy Speights, of Richmond, Virginia, passed away August 7, at the age of 78. Born April 4, 1879 and a lifelong resident of Richmond, Roy, as he was familiarly called by his innumerable friends and acquaintances was one of the best known and loved member of the electrical fraternity in his home city and state.

A charter member and past president of the Southern Section IAEI, charter member and past chairman of the Virginia Chapter and an honorary member of the Virginia Chapter, he took an active part in all association activities of both the Section and

Wheeler HI-OUTPUT FIXTURES
deliver more light per foot of lamp length!

HI-OUTPUT "D-8500" LINE FIXTURES by Wheeler—designed for use with 100 watt and 60 watt rapid start lamps operating at 800 MA.

Diffuser apertures provide a small upward component of light to relieve severe brightness contrast . . . and allow for heat dissipation.

Wheeler "D-8500" Hi-Output Fixtures are ideally suited for medium to high mounting applications.

Ask your electrical wholesaler — or write

Wheeler Reflector Company
DIVISION OF FRANKLIN RESEARCH CORP.
275 Congress Street, Boston 10, Mass.

Installation—Ucinite Div. of United-Carr Fastener Corp.

Another example of Wheeler's

"PACKAGE PLAN" LIGHTING —

the efficient, time-saving way to solve all your lighting requirements at one time . . . from one source!

Distributed Exclusively through Electrical Wholesalers

KNOPP

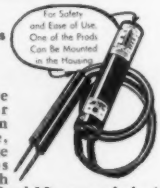
Phase Sequence Indicators save man-hours . . . you're sure of 3-phase connections

You just clip on the red, white, and blue leads. You see whether the sequence is A-B-C or C-B-A. This direct, positive reading saves time, gives you peace of mind.

With the Knopp Phase Sequence Indicator there are no fussy adjustments, no lamps. Disc-rotation-direction gives correct reading regardless of voltage or circuit conditions without changing taps or dials. By assuring properly connected polyphase wiring, you protect equipment. Use it on all voltages between 60 and 600, 2 phase, 3 wire, 25-60 cycles. On the higher voltages, it may be used up to 400 cycles.

This light-weight and rugged indicator is made for rugged field use by Knopp Inc., long-experienced specialists in manufacturing precision electrical equipment. There are no exposed metal parts. Fully insulated clips can remain attached between tests as safety push-button permits indication only when needed. Weighing but 21 oz., it is small and easy to carry. Leather carrying case optional. Order this widely used Model K-3 today or write for illustrated, free descriptive Bulletin No. 415.

KNOPP Voltage Testers have More Value for Your Money



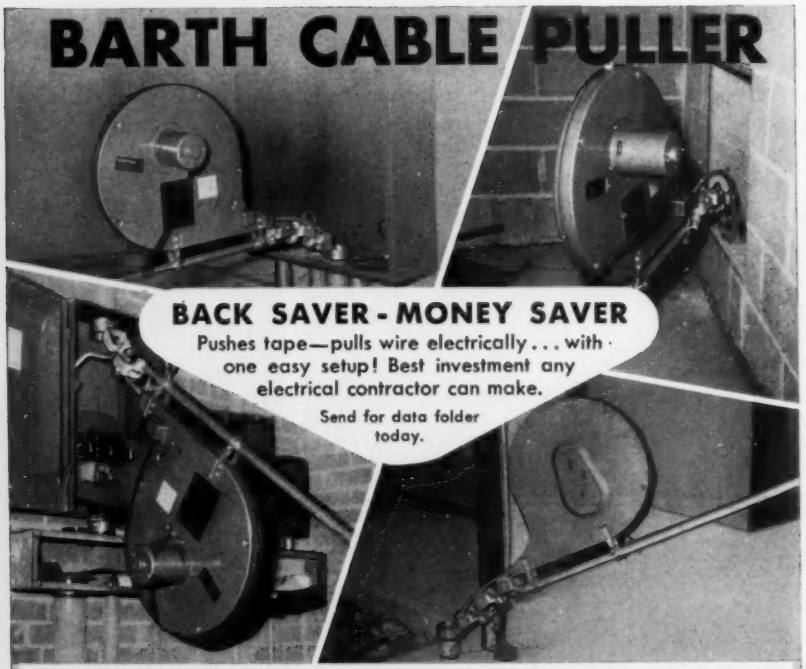
Here are more features for your money in this reliable, rugged voltage tester. Saves you time with its patented Prod-Mount and dual indication of voltage between 110 and 600 a-c or d-c, pure or rectified; 25 to 60 cycles. Pick up one at your dealer today or write for illustrated free Bulletin No. 425.

KNOPP INC.

Founded in 1928 by Otto A. Knopp under the name of Electrical Facilities Inc.

1307-A 66th St., Oakland 8, Calif.

BARTH CABLE PULLER



BACK SAVER - MONEY SAVER

Pushes tape—pulls wire electrically . . . with one easy setup! Best investment any electrical contractor can make.

Send for data folder today.

THE BARTH CORPORATION, 12672 Brookpark Road, Cleveland 30, Ohio

Please send complete Cable Puller Data Folder and prices.

NAME..... YOUR COMPANY.....

ADDRESS.....

CITY..... ZONE..... STATE.....

Chapter. He was also a member of Henrico Union Lodge A. F. & A. M.

Elected chief electrical inspector June 11, 1907 he served the City of Richmond for 17 years as such, resigning in 1924 to fill a similar position with the Virginia Electric and Power Company with whom he served until the age of 65 and retirement, in 1944. At the age of 69 he again entered the employ of the City of Richmond and remained until 1949.

Milton C. Very has been named district manager of the Southwest Gulf territories for **Fluorescent Fixtures of California,** manufacturers of

Milton C. Very

"All-Brite" fixtures, according to an announcement by **Charles D. Buchanan,** vice-president and sales manager.

Mr. Very will make his headquarters in Texas. He is a graduate of the University of California.

L. O. "Sherriff" Ledford, P. O. Box 110, Rossville, Ga., has been appointed district manager of the terri-

L. O. Ledford

tory encompassing Middle and East Tennessee, Whitfield County, Georgia, and Washington County, Virginia, for the **Electro Silv-A-King Corp.,** manufacturers and designers of commercial fluorescent and indus-

What good is a specialized business publication advertising?

No one is in a better position to give a hard-boiled, practical answer to this question than the men who spend their working lives on the sales front . . . the men the ads are supposed to help . . . the men who sell.

Here is the statement of a salesman who knows what advertising does for him when it appears in the industrial, trade or professional publications that serve the specialized market to which he sells:

William F. Mattes, Jr.
Lamp Division
General Electric

Sells retailers

Says Mr. Mattes:

"My selling is mostly with the headquarters offices of chains—variety stores and food stores. Matter of fact, some of these chains, particularly in the variety store field, do not permit salesmen to call on store managers. They prefer to interview sales people at headquarters, and then send out mimeographed letters to their districts and store managers.

"This makes our trade ads doubly important—they have to take the place of salesmen with the individual store manager or department manager; and they add color and pictures and enthusiasm to the letters that are passed down from headquarters.

"In the old days, the idea of trade paper advertising would simply be to say: 'Stock General Electric lamps, they have the best customer preference.' Today the tendency is to be more specific, to show pictures of the product, illustrations of displays, and pertinent merchandising information. For instance, it is a good merchandising service to be able to tell chain retailers the proportionate popularity of different size bulbs, different colors and types, so that the best merchandising effort is made on the fast selling items. Any facts like these in our trade advertising help the chain store managers and so, of course, make our sales effort that much easier and more productive.

"Trade advertising very definitely helped us introduce and sell packaged light bulbs. Half our unit sales come in bulbs in the 25 to 100 watt range. Knowing this, we put these popular sizes in a handy 4-bulb package. Merchandising bulbs in packages was quite a revolutionary idea when we first introduced them ten years ago, and trade advertising was used to help sell the idea to store managers. Of course, some variety stores still sell loose bulbs, but more and more the trend is toward package sales."

Why not **ask your own salesmen what your company's business publication advertising does for them. If their answers are generally favorable you can be sure that your business publication advertising is really helping them sell. If too many answers are negative it could well pay you to review your advertising objectives—and to make sure the publications that carry your advertising are read by the men who must be sold.**

ELECTRICAL SOUTH

One of the 207 members of National Business Publications, Inc. . . . each of which serves a specialized market in a specific industry, trade or profession.

trial fluorescent, incandescent, and mercury lighting fixtures.

Orangeburg Manufacturing Co., Inc., manufacturer of non-metallic pipe, has announced the appointment of two district sales managers to serve territories in the South.

Carl F. Arnold, formerly North Central district sales manager for the company, will serve the District of

Carl F. Arnold

Columbia, Maryland, West Virginia, Virginia, Kentucky, Ohio, and Western Pennsylvania as sales manager of

Joseph E. Milardo

the Central Middle Atlantic district with Washington, D. C., headquarters.

A native of Batesville, Arkansas, he is a graduate of Marion Institute, Marion, Ala., and was graduated from the U. S. Military Academy. Prior to joining Orangeburg, Mr. Arnold was associated with General Air Conditioning Corp., in Little Rock, Ark.

Joseph E. Milardo will supervise sales in the North Central district states of Kansas, Nebraska, Missouri, North Dakota and South Dakota, with office headquarters at 321 Ward Parkway, Kansas City, Mo. Mr. Milardo is a graduate of the University of Missouri, and was formerly connected with the York Corporation in Kansas City.

Charles C. Smith, Jr., has been appointed area sales manager of **Westinghouse Electric Corporation's** sales office in Atlanta.

Mr. Smith succeeds **H. H. Gray,** who has been assigned to the company's East Pittsburgh plant as assistant to the manager of industrial sales.

A graduate of Georgia Institute of Technology, where he received his bachelor of science degree in electrical engineering, Mr. Smith joined Westinghouse in 1939 as a member of the company's graduate student training program.

He has held positions in Atlanta and Baltimore in electronics and engineering sales.

Pass & Seymour, Inc., of Syracuse, N. Y., recently announced the appointment of **George Baier** of Dallas, Texas, as South Central District Sales

George Baier

Manager. Mr. Baier has more than twenty years' experience with the Pass & Seymour sales staff. He will assist the firm's two Texas sales representatives.

Three employees of the **General Electric Company** have been named to executive positions in the marketing organization of the Large Lamp Department.

Willard C. Brown becomes manager of lighting education. He will have responsibility for the Lighting Institute at Nela Park, and for lighting education programs designed for technical, professional, and leading civic organizations, as well as for various customer groups.

Mr. Brown is a veteran of thirty-seven years with the Lamp Division and received degrees in electrical engineering from Virginia Military Institute, Massachusetts Institute of

The one cable you can trust for . . .

DEPENDABILITY, FLEXIBILITY and VALUE!

AMERICAN

Bonded

ARMORED CABLE

To carry the load to any job, through dirt and grime, and around corners — use American Bonded Armored Cable. American meets every cable requirement — it's tough and flexible — and it's smooth surface means easier handling, too. For economy and superior performance always install American!

AMERICAN METAL MOULDING CO.

146 Coit St. **Irvington 11, New Jersey**

Atlanta Warehouse	Houston Warehouse	Dallas Warehouse
C. C. MYRICK	PEABODY BROTHERS	PEABODY BROTHERS
516 Elm, N. W.	240 Shea St.	3015 Taylor St.
Atlanta, Georgia	Houston 2, Texas	Dallas, Texas

Technology and Harvard University.

Arthur C. Barr, appointed manager of application engineering at Nela Park, joined the Lamp Division in 1941. He was active in the development of the "Slimline," "High Output," and "DeLuxe" fluorescent lamps.

Joseph B. Foley, who becomes manager of commercial and industrial sales, joined the lamp division in 1945. He has since held positions in sales and market development, and was associated with the Wright Aeronautical Corporation prior to joining GE.

The appointment of **William F. Leuszler** as national sales manager of **Titan Sales Corp.,** manufacturers and distributors of electric portable space heaters, was recently announced by **Richard K. Fleischman,** company president.

Mr. Leuszler's post is newly created, demanded by the increasing scope of the Titan operation and their rapidly increasing sales. He brings to his new association a wide background in the sales, merchandising and distribution of electrical housewares and appliances.

In this new post Mr. Leuszler will assist Mr. Fleischman in directing the sales efforts of Titan's nationwide distributor network, implementing sales policy at the distributor and store levels.

Vernon L. Wrye has just been appointed district sales representative for the **John C. Virden Company** in the Middle Atlantic states by R. W. Minett, Jr., director of marketing.

Mr. Wrye will be headquartered in Philadelphia and will promote the sale of Virden's newly expanded line

Vernon L. Wrye

of residential, commercial and industrial lighting fixtures in eastern Pennsylvania, Maryland, Delaware, central and southern New Jersey and portions of the metropolitan New York area.

New products

Alternating current hour meter for panel mounting

A SQUARE FACE alternating current hour meter has been added to the line of hour meters manufactured by the John W. Hobbs Corp., Springfield, Illinois.

This is a direct reading meter used to log total hours of machine or equipment operation. The square face meter is particularly suitable for panel mounting.

The new meter is available in 120V - 240V - 480V in 50 or 60 cycle. This meter is fully described in Hobbs new catalog No. AC 587B. Free on request.

For additional data, ask for item P-913, using the coupon on page 125.

One and two gang chrome wall plates

A NEW LINE of chrome wall plates has been introduced by the Wiring Device Division of Royal Electric Corp., Pawtucket, Rhode Island.

Featuring the beauty of chrome, the finish of glass, and the durability of steel, the new plates are available in both one-gang and two-gang styles, and will fit all standard devices. The smooth, highly-polished face has no dirt-catching slots, and is easy to keep clean.

Each plate is individually packaged in a 3-color-printed cellophane envelope, with mounting screws; one-gang plates 25 to a carton, two-gang 10 to a carton.

For additional data, ask for item P-914, using the coupon on page 125.

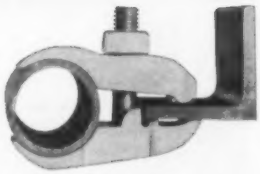
UL approves wrought iron rigid electrical conduit

WROUGHT IRON electrical conduit has been granted the use of the nationally recognized label of Underwriters' Laboratories, Inc., following a series of rigid tests and inspections conducted by the approving organization.

Label authorization, awarded to A. M. Byers Co., Pittsburgh, manufacturer of wrought iron, will result in manufacture of wrought iron rigid conduit with hot-dip galvanized or vinyl plastic coating in ¾ to 6-inch trade sizes.

Latrobe PRODUCTS

FLOOR BOXES • WIRING SPECIALTIES



PRODUCTS

Floor Boxes • Cover Plates
Pipe or Conduit Hangers
Gang Boxes • Junction Boxes
Nozzles • Fish Wire
Cable Supports
Insulator Supports
Staples and Cable Clips

"Latrobe" Pipe or Conduit Clamp

This clamp is made of highest quality malleable iron, with a double safety bite of case hardened tool steel and is cadmium plated to prevent rust. Two models—one for Right Angle and the other for Parallel support. Each model comes in 10 sizes to handle pipe or conduit 1/2" thru 4".

Represented in the South by

CARY CHAPMAN & COMPANY
702 Whitehall St., S.W., Atlanta, Ga.
213 S. Front St., New Orleans 12, La.
1009 South Elm St., Greensboro, N. C.

F. P. WALTER COMPANY
4030 Chouteau Ave., St. Louis 10, Mo.

JIM ROBERTSON & COMPANY
2104 Irving Blvd., Dallas, Texas
1901 Commerce St., Houston, Texas

FULLMAN MANUFACTURING CO.
LATROBE . . . PENNSYLVANIA

CUT

POWER DISTRIBUTION COSTS WITH THIS VERSATILE CABLE

Triangle Type RR Cable is rubber insulated and neoprene jacketed. Three top-grade rubber insulations are available to match the service requirements. The jacket is Triangle's Trioprene, a neoprene compound developed especially for its toughness and resilience, its good aging and heat resisting properties, plus its ability to withstand severe weather conditions, oil, grease, and most chemicals.

Flexible, light weight and tough, it is easier to handle, splice, or terminate than metallic sheathed cable, has lower first cost. And, its suitability for overhead, or underground, or duct installations makes it unnecessary to carry more than this one type in inventory. Approved for Airport Lighting Cable Type A (CAA L-824) and for Underground Service Entrance, Underwriters' Laboratories Type USE.

TRIANGLE CONDUIT & CABLE CO., INC., New Brunswick, N. J.

Write for Bulletin RR

Buy Smart — Buy from Your Distributor!

TRIANGLE
It MUST Be Right!

Wrought iron pipe has frequently been specified for conduit installations, mainly for highways, bridges and power plants where corrosion and vibration constitute hazards to electrical systems.

For additional data, ask for item P-915, using the coupon on page 125.

"Companion series" lighting fixtures

GLEAMING brass, copper or triple-plated chrome creates a stylized modern lighting fixture design produced in "companion" sizes by Markstone Manufacturing Co., 1351 Kingsbury St., Chicago 20, Ill.

Non-glare opal glass conceals the bulbs and provides softened, eye-easy illumination. All construction is of

top quality, including ceiling pans insulated with Fiberglas, white porcelain sockets with asbestos leads, and knockout for switch.

The larger unit (No. 901)—only 4¾ inches deep—is 12¾ inches in diameter, takes three 60-watt bulbs. No. 900, the 9¾ inch size, only 4½ inches deep, takes two 60-watt bulbs. In addition to affording 'scaled" lighting for dining-kitchen areas and unified design to tie the rooms together, these fixtures are ideal for other installations such as reception areas, hallways, rumpus rooms, boys' rooms, dens, etc.

For additional data, ask for item P-916, using the coupon on page 125.

Portable electric drill kit for conduit wiring and pipes

THE DIAMOND drilling unit recently introduced by the Truco Water Swivel Division of the Wheel Trueing Tool Co., 3200-127 West Davison Ave., Detroit 38, Mich., achieves a new high in portability and carrying ease.

The unit is designed primarily for drilling anchor holes and small holes for the installation of conduit wiring anp pipes. It is especially efficient in drilling ceramic tile, granite, marble, concrete but is not recommended for drilling in any masonry material where reinforcing bars will be encountered. It gives high speed, clean, quiet, economical drilling with bits up to 1¾" O.D.

The Truco Junior Swivel Drill Kit consists of a heavy-duty drill motor operating at 2500 rpm with integral water swivel which supplies water to

the diamond bit to flush away cuttings. This unit weighs only 7½ lbs. and is easy to handle in any position. The combination, with 10-foot heavy-duty electric cable and 10-foot water hose, comes complete in a steel carrying case with a handle. The complete kit weighs but 15 lbs.

For additional data, ask for item P-917, using the coupon on page 125.

Motor starter enclosures for hazardous locations

EXPLOSION-RESISTING motor starter enclosures for NEMA 7 (Class 1 Groups C and D) and NEMA 9 (Class 2 Groups E. F. and G) have been announced by the Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.

These enclosures have threaded joints and are dust-tight and weather-

proof, permitting them to be used in outdoor, hazardous locations.

Cast from high-density aluminum alloy, the enclosures consist of a collar section, an upper tank and a lower tank. Two types of collar sections are available, one with a circuit breaker operating mechanism and one without.

Tanks have internal Acme thread for maximum strength and to reduce the possibility of thread damage with the tanks removed. This threading

BUY

ALL TRIANGLE PRODUCTS LOCALLY FROM YOUR ELECTRICAL DISTRIBUTOR

It's smart today to buy all your electrical needs — switches, fittings, wire, conduit, cable — from your nearby distributor. One call shopping saves you time and money.

Your distributor's warehousing saves you countless cubic feet of valuable floor space, and assures you of a constant flow of fresh materials as your production demands.

Your distributor gives you

Fast delivery . . . on one item or a hundred— from one manufacturer, or from many.

Simplified bookkeeping . . . one invoice, one statement, one account.

Low inventory cost . . . his stock is your inventory control, gives you working capital.

Lower insurance rates . . . less inventory means your flood, fire rates are lessened.

That's why dependable electrical manufacturers advise you to always buy from YOUR DISTRIBUTOR — THE BEST FRIEND YOUR BUSINESS CAN HAVE! He's the one source for everything electrical — and he's local.

TRIANGLE CONDUIT & CABLE CO., INC., New Brunswick, N. J.

Your Distributor— The Best Friend Your Business Can Have!

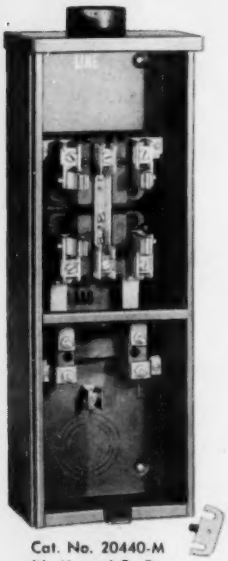
Buy Smart — Buy from Your Distributor!

TRIANGLE "It MUST Be Right!"

ANCHOR

ANNOUNCING
THE NEW 20040 SERIES 200 AMPERE SOCKETS

Cat. No. 20040. No By-Pass



Cat. No. 20440-M with Manual By-Pass Covers Removed

LOWER PRICED

POSITIVE CONTACT JAWS

LOW TEMPERATURE RISE

EASY TO INSTALL METER

With manual or automatic by-pass or without by-pass. Automatic by-pass operates when meter is installed or removed.

Terminals for 4/0 are suitable for copper or aluminum wire; with either maximum diameter screws with specially cupped ends or with pressure plate type screws.

For 4-5-6-7 terminal meters.

Copper parts are tin-plated, steel parts cadmium plated.

Live parts are mounted on heavy porcelain bases.

Fifth or sixth terminals can be added in the field.

Boxes are of galvannealed steel or aluminum for surface or flush mounting.

Over-size boxes available for underground services. Extra long boxes available for special requirements.

ANCHOR MANUFACTURING CO.
MANCHESTER, NEW HAMPSHIRE

also prevents the entrance of rain, when installed. A plugged and tapped opening in each tank is provided for the addition of a drain and breather.

For additional data, ask for item P-918, using the coupon on page 125.

Service entrance fitting needs no clamping device

A SERVICE ENTRANCE fitting that can be installed on an unthreaded conduit without the need for any special clamping devices is the new-

est addition to the family of aluminum fittings manufactured by Killark Electric Co., Vandeventer and Easton Ave., St. Louis, Mo.

Aptly named the Speed-O-Let service entrance fitting, the new fitting is installed by simply slipping it over the end of the conduit and tightening two screws.

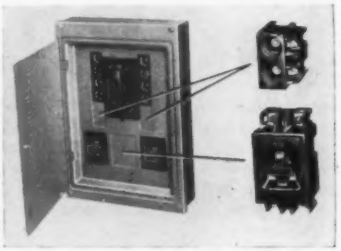
A special 3-point suspension created by three internal balance ribs assures perfect alignment of the fitting, eliminates stripped threads and cocked fitting possible with conventional threaded entrance fittings.

For additional data, ask for item P-919, using the coupon on page 125.

Flexible service equipment provides for future loads

AVAILABILITY of new 100 ampere pullout service equipment has been announced by the Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn.

These 100 ampere units, featuring the exclusive add-on branch circuits, supply complete line coverage—from



8 to 20 fused circuits—with only a fraction of the inventory required with conventional-type equipment.

Add-on fuse sections, as well as the 30 and 60 amp pull-out units, are attached by screw connection and do not rely on stab-type tension alone for connection. This assures positive contact at all times and provides a safeguard against over-heating. Add-On Circuits are factory-assembled and ready to attach by means of captive, guided screws.

For additional data, ask for item P-920, using the coupon on page 125.

Modular fluorescent offers more light, less brightness

FEWER FIXTURES for the same lighting level are required with the wide area, shallow Widelouve by All-Brite Fluorescent Fixtures, 352 Shaw Rd., South San Francisco, Calif.

The twenty-four inch modular unit is versatile in design and easily maintained. Surface or recess mounting available.

The louvers, baffle type, providing 35-35 shielding, are held firmly in place by means of one positive action latch per louver section so that no portion of the fastening device is visible on the exterior surface of the fixture.

For additional data, ask for item P-921, using the coupon on page 125.

Spring latch-hinge holds flange to recessed fixture

DETRACTING fixture screw-heads, nuts, and hinges are eliminated from the ceiling by a new line of recessed

incandescent lighting fixtures announced by Curtis Lighting, Inc., 6135 West 65th St., Chicago 38, Ill.

Called the 24000-25000 series, the new fixtures can be installed in all major types of ceilings in stores, reception rooms, large offices, and all commercial interiors.

The unbroken ceiling plane is provided through use of a newly-developed spring latch-hinge that holds the flange to the fixture. To service the fixture from above or below, the flange can be removed quickly without the use of tools. Reflectors are

Sell and Install

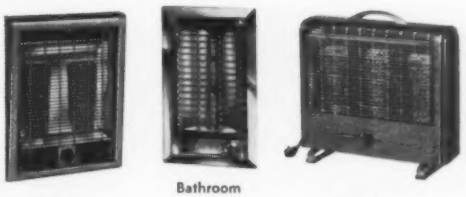
CAVALIER ELECTRIC HEAT

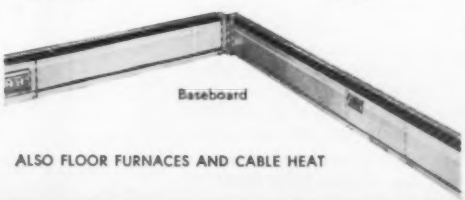
for Conversion

Surveys show **six billion dollars** will be spent in 1957 for converting heating, cooling and plumbing systems in U. S. homes. Get your share of this bigger-profit business!

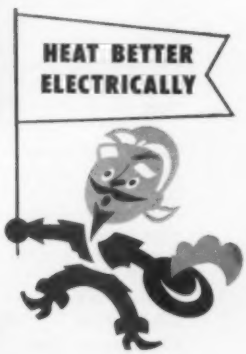
Many electric heating contractors concentrate on new construction. A good market, but highly competitive. When you sell and install Cavalier Electric Heat to **replace existing systems** or **cure hard-to-heat spots,** you usually set your own price!

Cavalier has a complete line of electric heating equipment for every need. It is **the** quickest and easiest automatic heating system to install. Popular baseboard styling, for example, goes in without cutting a single wall.





ALSO FLOOR FURNACES AND CABLE HEAT

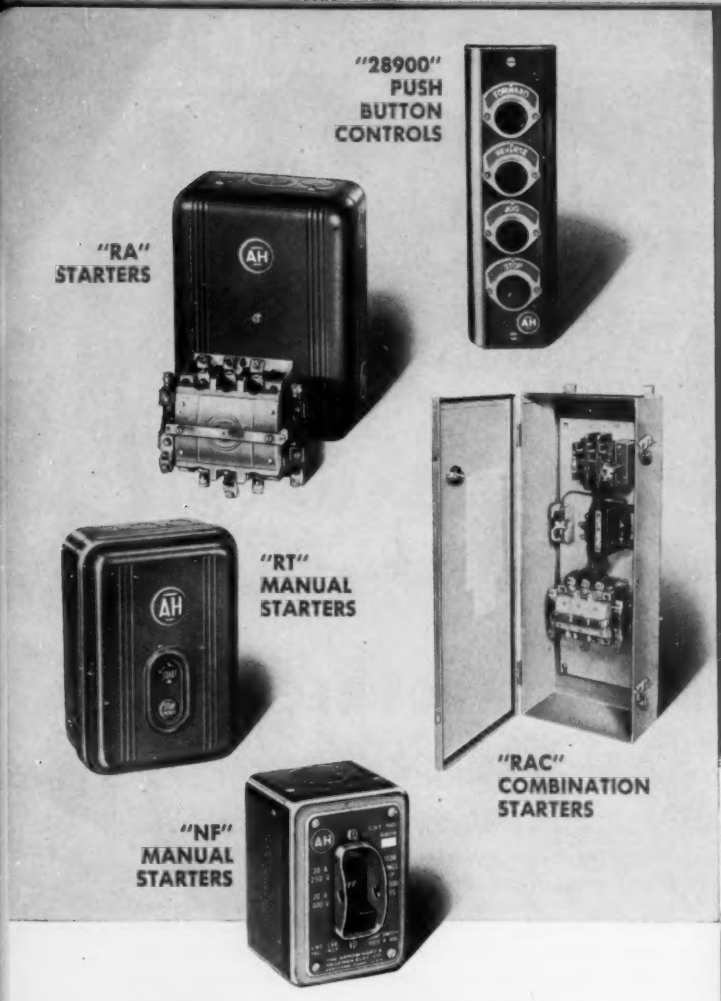


For complete details, see your distributor or write:

ELECTRIC HEATING DIVISION

CAVALIER CORPORATION, Chattanooga 2, Tennessee

Quality Products Since 1865



ARROW AH HART

WHEN LOOKING FOR GOOD PRODUCTS . . .

LOOK FOR A GOOD NAME

The motor controls shown above, and all the other products in the *complete* ARROW-HART motor control line, bear a name that has earned a high rating in the electrical industry during the past 67 years. This fine name — ARROW-HART — is your assurance of motor controls you can rely on for quality and dependability.

Outstanding service — on-the-job assistance from field engineers for Arrow-Hart Distributors, Electrical Contractors and Plant Engineers — is another reason for ARROW-HART'S fine reputation. This combination of a *complete* line, a superior product *and* superior service makes ARROW-HART motor controls the *logical* choice. Write for a free copy of new Catalog No. 12 to The Arrow-Hart & Hegeman Electric Company, Dept. ES, 103 Hawthorn Street, Hartford 6, Connecticut or contact your nearest Arrow-Hart distributor.

ARROW AH HART

Quality since 1890

MOTOR CONTROLS • ENCLOSED SWITCHES
APPLIANCE SWITCHES • WIRING DEVICES

held firmly in place on a support-collar, without screws or locks.

The series includes flange and flush-mounted models, with flush or regressed lenses. A regressed lens reduces ceiling brightness ratios with no loss of lighting efficiency. Aperature openings range from 5⅞ inches to 9⅜ inches.

For additional data, ask for item P-922, using the coupon on page 125.

Double spring door weatherproof receptacle

AN EASILY installed, surface-mounting, weatherproof cover and box—the 4542 Spring Door Unit by

Pass & Seymour, Inc., Solvay Station, Syracuse, N. Y., provides safe, simple duplex outlet operation in any area exposed to the elements.

Two hinged covers are firmly attached to the new unit's box. The covers open easily and snap shut automatically. When one half of the outlet is in use, the other half is securely closed.

On the plate and on the rim of each cover sharp ridges bite into rubber gaskets forming positive watertight seals. Wire is brought through the wall into a rubber grommet. The box mounts quickly and easily on any flat surface and remains closed against all weather by simply tightening the wall screws.

For additional data, ask for item P-923, using the coupon on page 125.

New package design reduces wiring time

PULL-REEL, new concept in wire packaging has been introduced by the

wire manufacturer, Texas Wire & Cable Company of Plano, Texas.

Easy to handle—stays "put"—gives

wrench, has been introduced by the

anchoring ease—attic ease in rewiring. Pull-Reel releases wire easily, with a "straight pull" that eliminates kinking or twisting and without lost motion for stopping to untwist. Pull-Reel does it the easy way, keeps wires straight—easy to cut to the exact length needed eliminating wire waste. Excess wire readily reels back into carton for full protection.

Pull-Reel packages may be lined up for pulling two wires, three, five or even more at one time—all absolutely straight. At present, Narawire TW and Narax non-metallic sheathed cables are packaged on Pull-Reel, and are available in 250 feet, 500 feet, and 1,000 feet lengths.

For additional data, ask for item P-924, using the coupon on page 125.

Synchronous motor protection during starting and running

SYNCHRONOUS starters (2200-4800 volts), manufactured by the Electric Controller and Mfg. Co., 4500 Lee Rd., Cleveland 28, Ohio, provides a simple, safe method for starting and bringing synchronous motors into synchronism.

A push of the "start" button gives complete protection during starting and running—plus fully automatic synchronization. Throughout the entire sequence, motor windings are completely protected and synchronization occurs at the most favorable time.

Should the motor pull out of step because of voltage dip or overload, the field is automatically removed. Re-synchronization occurs when the motor re-accelerates the load. Short circuit protection is provided by current-limiting power fuses working in conjunction with high-interrupting-capacity ZHA air-break contactor.

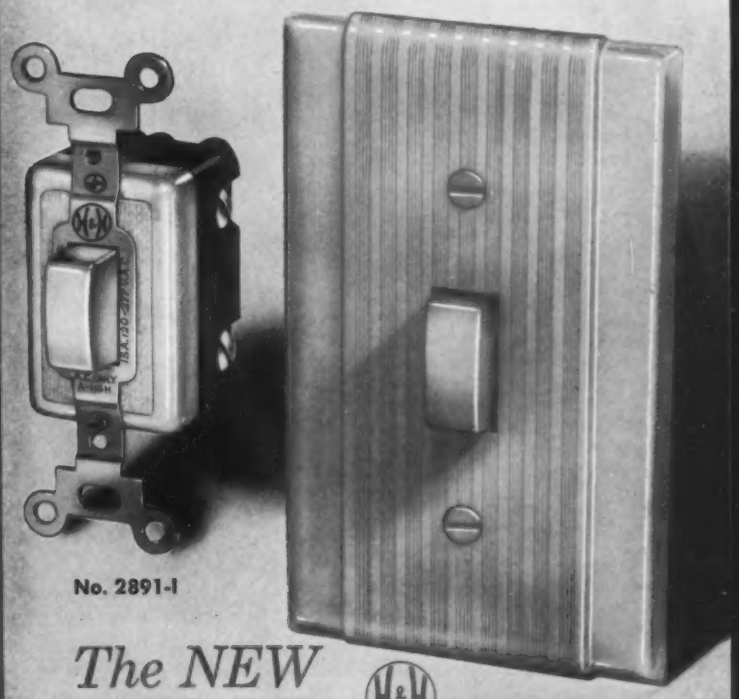
For additional data, ask for item P-925, using the coupon on page 125.

Corrosion resistant fitting installed without wrench

SPEEDOLETS, the thinwall fitting that can be installed without use of

ARROW AH HART

Here's a SOFT TOUCH for Greater Profits . . .



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The NEW H&H

ARROW-HART *Quiette*

TAP ACTION SWITCH

For new installations or modernizing, it's easy to build customer satisfaction and bigger profits with this newest touch in lighting control. The Quiette Tap Action Switch – WHICH FITS ANY STANDARD TOGGLE WALL PLATE – turns quietly on *or* off at the tap of a finger-tip, hand or elbow. No toggle to flip, no knob to twist. Safely controls appliances and incandescent or fluorescent lights.

- **H&H SPECIFICATION GRADE, UL APPROVED**
- **15 AND 20 AMPS, 120-277 VOLTS, AC ONLY**
- **SCREWLESS TERMINALS OR BINDING SCREWS**
- **AVAILABLE . . . IN BROWN OR IVORY, SINGLE POLE, DOUBLE POLE, 3-WAY AND 4-WAY.**

Electric Company, Dept. ES, 103 Hawthorn Street, Hartford 6, Connecticut. Offices and Sales Engineers in principal cities.

ARROW AH HART

Quality since 1890

MOTOR CONTROLS • ENCLOSED SWITCHES
APPLIANCE SWITCHES • WIRING DEVICES

wrench, has been introduced by the Killark Electric Mfg. Co., Vandeventer and Easton Ave., St. Louis, Mo.

To install, the contractor simply slips the fitting over the conduit and tightens the screw.

For additional data, ask for item P-926, using the coupon on page 125.

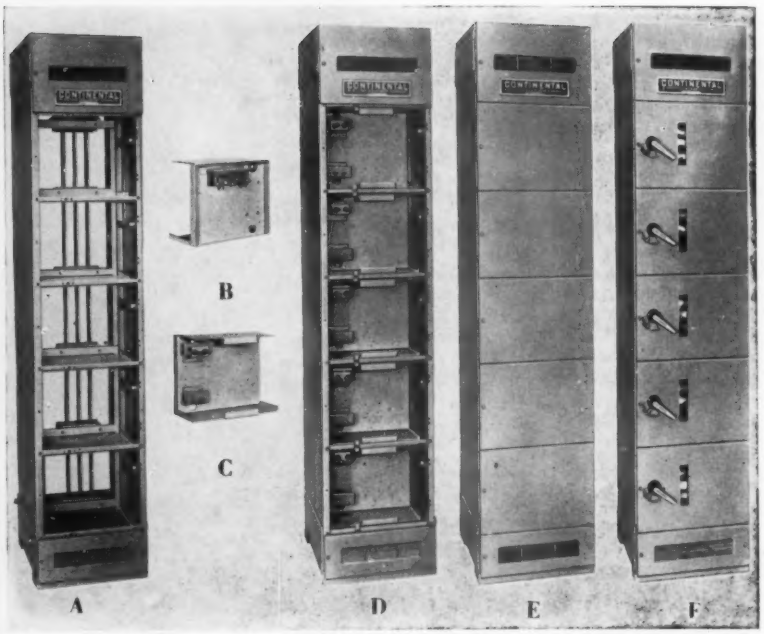
Dual-purpose tape fuses to solid unit

OKOWELD TAPE, manufactured by the Okonite Co., of Passaic, New Jersey was designed for splicing and terminating either plastic or rubber cables.

For connections operating under 2000 volts it serves as both insulation and sheath . . . no other tape is required. While possessing optimum electrical characteristics, is also resistant to weather, chemicals, flames and mechanical abuse. It can jacket as well as insulate. It comes in five colors for phase and circuit color-coding.

Upon application, this new tape rapidly fuses into a solid, homogeneous wall around the connection. No adhesives are involved.

For additional data, ask for item P-927, using the coupon on page 125.



Motor control centers with interchangeable units

PLANT engineering and electrical maintenance departments can now easily and economically plan and assemble their own motor control centers with "Basic Structures," a new product of Continental Electric Equipment Co., 205 West 4th Street, Cincinnati 2, Ohio.

The modular vertical metal structures provide the framework and enclosure in which to mount motor controls. Each structure is complete with horizontal and vertical busing, and a choice of plug-in type unit mounting bases, compartment heights and door types.

For additional data, ask for item P-928, using the coupon on page 125.

Vaportight lighting units for all-purpose mounting

THE SPERO Electric Corp., 20500 St. Clair Ave., Cleveland 17, Ohio, has just introduced a full line of vaportight lighting fixtures. The units are available in pendent, ceiling, outlet box, wall and angle types, with or without reflectors or guards.

In addition, the manufacturer makes a complete line of RLM reflectors, high bays, floodlights, and materials for electrical construction.

For additional data, ask for item P-929, using the coupon on page 125.

Interlocked armor cable terminators and fittings

A COMPLETE LINE of interlocked armor cable terminators, cable supports and splicing fittings for use with all types of interlocked armor cable has been developed by O. Z. Electrical Manufacturing Co., Inc., 262 Bond St., Brooklyn 17, N. Y.

Eleven different types comprise

NEW EDITION
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This new, entirely different estimating guide has 175 completely worked out charts.

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(September 1957)

the new line of Terminators, including watertight and non-watertight types and upright, horizontal and inverted types. Nominal diameters over armor range from .45 inches to 4.28 inches.

Sixteen types of O. Z. Splicing Fittings are available and include all splicing materials required to make the cable splice, such as two-way straight splices or three- or four-way "Y" and "X" splices.

For additional data, ask for item P-930, using the coupon on page 125.

Underground systems

(Continued from page 46)

for use both in the office and in the field and, to insure its complete usefulness as a practical engineering reference work, the editors made every possible effort to keep the text nonregional in character.

The book reflects the consensus of the engineers responsible for the design and operation of underground distribution systems, concerning the most approved practices employed in the field today. Standards, specifications and instructions were solicited from 34 of the country's largest electric utilities and questionnaires were circulated to collect information not adequately covered by individual company standard practices.

Composed of engineering authorities from many different sections of the country, the editorial staff includes personnel of all the electric companies operating extensive underground systems and representatives of manufacturers supplying equipment for such systems.

Each of the 15 chapters in the reference book deals with a principal division of the general subject of underground systems. The first nine chapters are primarily concerned with design features and the last six with operation. Following an introductory section on the historical development of underground distribution systems, there is a chapter devoted to each of the following subjects: Applications for Cable and Cable Systems; Cable and Cable Insulation; Bulk Power Systems; Underground Radial and Loop Systems; Underground Secondary Networks; Street Lighting Systems; Conduits and Manholes; Cable Installation (including a section on aerial cable); Cable Joints and Terminations; Cable and Underground Equipment Loading; Cable Testing, Fault Location and Cable Identification; Records, Repairs and Maintenance; Cable and Equipment Reconditioning; Corrosion (and its mitigation); and Safety Practices.

Every chapter treats its subject

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They're thrifty! M&W Kits contain every needed fitting for a quick, reliable wiring job. No lost time, no costly inventory. *They're fast!* Modern, time-saving slip-fittings are used throughout. With no thread-cutting, you reduce installation time to fractions. Complete range of sizes and fittings available to meet all local codes and conditions.

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Complete-package Kits are furnished to your order and including fittings shown above.

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The M. & W. ELECTRIC MFG. CO., Inc.
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24" - 120" SIZES!

ONLY "BUFFALO" OFFERS THIS COMPLETE LINE OF HUSKY, EFFICIENT PROPELLER FANS.

- Opens the door to many *big* jobs formerly possible only with costly fans!
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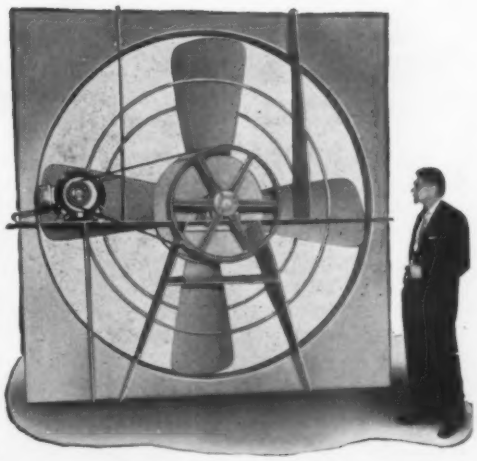

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INDUSTRIAL EXHAUSTERS BELTED VENT SETS PROPELLER FANS
"E" BLOWERS-EXHAUSTERS

"Buffalo"

exhaustively. Practices and descriptions of equipment common to both underground and overhead construction are included. All widely used practices known to the editors have been described objectively to enable the reader to choose those practices best adapted to his particular conditions.

Highly technical discussions, such as those in the chapter on cable and equipment loading, are amply supported by references to the original articles, books and papers from which information was drawn. Technical data are in tabular and graphic form for convenient use in the solution of practical problems. Use of a great many formulas and equations in the solution of problems is shown by detailed examples.

More than 900 photographs and drawings illustrate the equipment and practices discussed throughout the text. More than 150 tables, used to emphasize subject matter, are listed for ready reference in the front of the book. An extensive and carefully selected bibliography of literature particularly pertinent to the subjects under discussion is provided. The book is indexed in minute detail and cross-referenced for convenience.

Lighting award

(Continued from page 52)

all lamps presently marketed, paints in every hue of the spectrum and many decorations, Bell finally settled on a Bahaman five-pronged starfish for the job.

The animal matter was removed and the husks allowed to dry naturally in the hot sun. The husks were then sprayed with clear lacquer and gold and silver tinsel applied immediately. A crystal sealing liquid was then sprayed over the entire starfish to waterproof and fireproof the fixture.

Fabrication included threaded ⅛-inch pipe, candelabra base sockets, stems and canopies. After assembly, these were painted black so the metal portion would blend in and become invisible against the completely blackened ceiling. Bell then installed silver-bowled lamps, satisfactory because of the upward diffusing quality of the bulb.

Bell installed 164 of these starfish lights in the large ceiling bay spaces of the main dining room, bar, lounge, snack bar and on the screened porch areas. To obtain sufficient control of the lighted clubhouse, dimmer controls were used which can be dimmed down to resemble candlelight. To obtain necessary lighting, two foot-candles of illumination are maintained in the bar and lounge areas, and up to 10 foot-candles in the dining area, and 20 in the kitchen.

Subordinate lighting was installed after the prime clubhouse job was completed. The swimming pool was illuminated, as well as the yard and spotlighting of the piano to compliment entertaining artists.

Bell enterted his lighting job in the "My Most Interesting Lighting Job" contest held at a dinner meeting of the Illuminating Engineering Society at Tampa. It was promptly declared the state winner and eligible for competition by the regional conference in Atlanta next September.

The contest was held to stimulate a greater interest in the activities of the society among contractors, engineers, architects, etc.

Repeat business

(Continued from page 33)

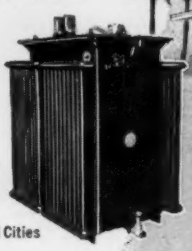
immediate results from his display space, but he does expect the advertisements to affect the repeat business he values. Prospects reading about wiring for air-conditioning call in for other work. The plainly indicated telephone number is one reason. The Houston number sometimes appears three times in one newspaper advertisement. On the trucks, it can be read from almost any angle, including the rear.

Although Houston is making his successful drive for volume in home wiring and repairs, he also does industrial work. Here, again, he stresses fast service on repairs. Because his electricians are required to keep in frequent touch with him by telephone, he can relay emergency repair calls with little or no delay.

Houston spends most of his time at headquarters. He feels that he must be on hand to give estimates and to care for the service calls that come in all day. His own residence telephone number is one of the two numbers listed in his large display advertisement in the telephone directory that may be called for emergency 24-hour service. And he answers emergency calls to residences as well as to industrial plants.

The New
GOLDEN GATE
in Miami Beach
transforms
a vacation into
an event.

And for the finest in transformer value, this famous resort uses MARCUS for power and lighting distribution. You, too, can guarantee trouble-free performance and a real vacation from maintenance and replacement problems by specifying MARCUS for your next transformer installation.



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"Mark of Quality"

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A COMPLETE LINE OF DRY TYPE AND LIQUID-FILLED TRANSFORMERS

LOOK—MR. CONTRACTOR

2000 watt Electric Heating Cable
only $8.85 from Your Jobber

WHY PAY MORE?

- UL Approved
- Nylon Jacketed
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Other Sizes — 250-5000 Watts Proportionally Priced.

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TENNESSEE PLASTICS, INC.

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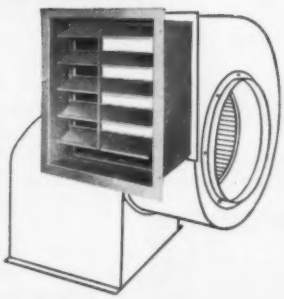
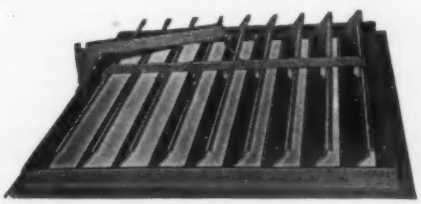
Elgo Ventilating Specialties

AUTOMATIC SHUTTER for Unit Blowers

Self - contained in adapter sleeve for attachment to blower. Louvers of light gauge aluminum with felt silencer strips. Rustproof hinge rods. Weatherstripped. Built to fit your blowers.

Write for circular and prices





"Echo" Automatic Ceiling Shutters

Used for attic ventilation. Installed in attic floor at the base of a penthouse, the louvers being operated by the suction of the fan.

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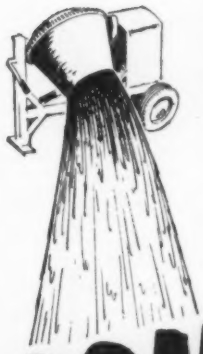

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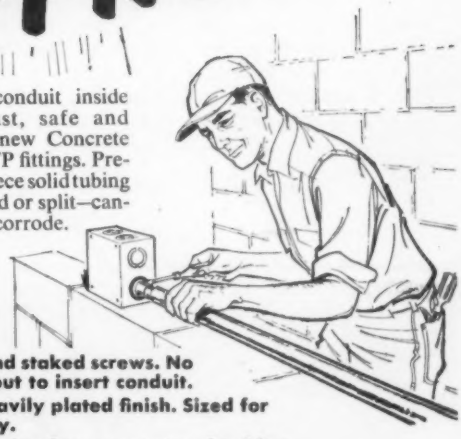
SET SCREW CONNECTORS & COUPLINGS

CONCRETE APPROVED

Now — lay conduit inside concrete fast, safe and surely with new Concrete approved ETP fittings. Precision one-piece solid tubing cannot spread or split—cannot leak or corrode.



UL

- **Pre-set and staked screws. No backing out to insert conduit.**
- **Bright heavily plated finish. Sized for uniformity.**
- **Self-centering box connector shoulders. Available in ½", ¾", 1", 1¼" and NEW 1½" and 2" sizes.**

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State of Florida Representative
ELECTRA
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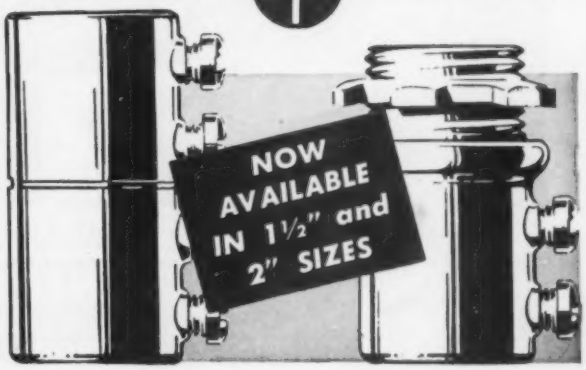

High frequency

(Continued from page 35)

lighting, with an alternate bid to provide for the increased voltage and frequencies described. Excluding the cost of the lighting equipment and the generator, there was a difference of $1,840.00 favoring high-frequency because of the savings in wiring for such a system.

Added to the lower cost in air conditioning equipment, the low cost of capacitors compared with conventional ballasts, and the use of two lamps where three would be required at 118 cycles (because of greater lamp efficiency at high frequency), these savings were more than enough to pay for the generator and power correction coils.

Due to increased efficiency, fewer lamps, and greater flexibility, power consumption is about 20% less than with a 60 cycle system. If lamp life is found to be increased at higher frequencies, that will be another saving in operating cost.

Under favorable conditions it seems possible to reduce electrical contracts by 10 per cent to 15 per cent through the use of such a system where the conditions and size of the operation warrant the installation.

Accidental grounds

(Continued from page 40)

and make it obvious that the fault is on a branch circuit radiating *from* that load center (or panel).

Assuming that the ground is more remote from the source and by moving from load center to load center progressively along the feeder in a direction away from the 'bus, the voltmeter readings will become correspondingly smaller and smaller, and the point where the least voltage is registered then automatically becomes the "fault area," meaning that this is the vicinity of the fault. It then only becomes necessary to check the local pieces of equipment in this limited area in order to find the ground.

The operator using this method should be aware of the fact that in the case of a feeder serving a number of load centers, the successive voltmeter readings will reduce in value both for the reason he is approaching the ground location and also because the feeder load (in amperes) is reducing as he proceeds further along the cable or bus away from the main feeder.

It might also be pointed out that electricians are able to determine by experience from the magnitude of the readings obtained at the switchboard approximately how far away the ground is located. They are, therefore, often able to omit testing at nearby load centers clear of any suspicion.

Meter damage risk

If at the moment of taking a reading with the voltmeter the ground should for some reason clear itself, the voltmeter is subject to damage (but not always) because it would be subject to a static neutral voltage of some 260 volts. For that reason, use a cheap instrument.

If the ground is momentary or of short duration, you will suspect a certain drive by the nature of the intermittency of the signal provided by the ground lamps. Searching for a fluctuating ground with the low-reading voltmeter can be done, but at the risk of damaging the meter.

Always be certain to connect the meter to the *grounded* phase. The ungrounded phases have a potential to ground equal to the phase voltage. *Never* allow yourself to be part of the circuit between legitimate ground and a grounded bus. Should such ground clear itself—or, after clearing, another phase becomes faulted, injury or death may result.

The shifting of the voltmeter from load center to load center, connections being made at these points usually by merely opening the door of a convenient safety switch or starter, is equivalent to moving the slider along an old-fashioned, simplified form of the Wheatstone Bridge. If the grounded feeder were an uninsulated trolley paralleled by a bare ground conductor, the volt-meter connected to sliding contacts could be moved along the wires to the point of zero deflection (or voltage, or current), which would be the point of fault. Testing at successive load centers approximates this operation. The attached diagram illustrates a typical case in "one-line" form.

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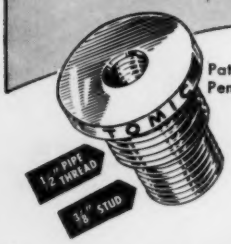

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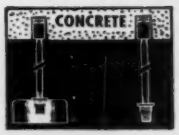
NO. 711A I.D. 1/4" x 20 Thread

NO. 711B I.D. 3/8" x 16 Thread

Only one ½" locknut required to secure box. Simplifies conversion from ¼" or ⅜" threaded rod or bolt to fixture stem.

A New Simplified Way to Hang Fixtures From Suspended Ceilings

Hanging from bar joists



Continuous row stem fixtures. Tremendous advantage for this application.

Hanging from ceiling channels.

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ORIGINATORS and Manufacturers of Famous TAP-ON and TWIST-IN Fittings

20,000 SHERWOOD AVE. • DETROIT 34, MICHIGAN

ELECTRICAL SOUTH
806 Peachtree St., N.E.
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September, 1957

Gentlemen:

Please send me additional information on items mentioned in this issue of Electrical South. I have listed the key numbers of these items at right.

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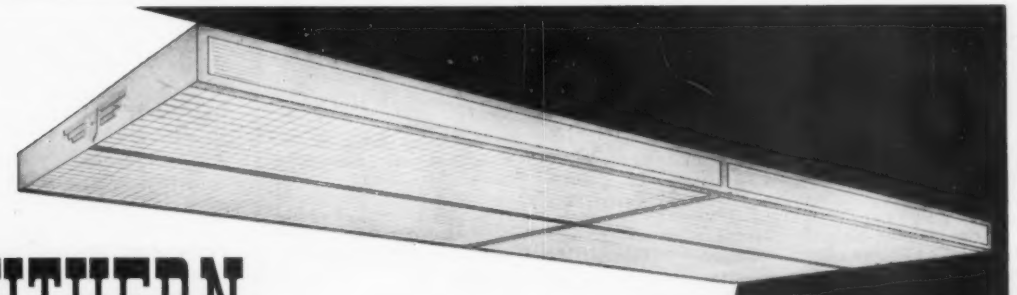


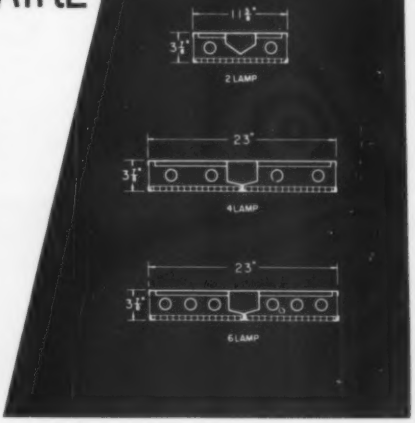
SOUTHERN

SHAL-O-LITE LUMINAIRE

This shallow luminaire may be used as an individual unit, in continuous rows, or arranged in various patterns. When surface mounted, the plastic side panels of ribbed, polished diffusing polystyrene illuminate the adjacent ceiling. The white translucent louver of molded 5/8" cubicles provides 42-degree shielding lengthwise and crosswise.

Available in two, four, or six lamp luminaries with Rapid start, Slimline, or starter type ballasts.

Remember, specify and satisfy with SOUTHERN fluorescent fixtures.



SOUTHERN LIGHTING MFG. CO.
502 ELWELL ST. ORLANDO, FLORIDA

Know the Law

(Continued from page 90)

Court's answer: Yes. (All State Pipe Supply Co. v. McNair, 89 So. 2d 774, decided September 12, 1956, by the Florida Supreme Court.)

The court said that by failing to notify the owners of its claim, the supply company merely lost priority over other liens by claimants who did give the notice. But that did not release the owners from liability because they did not take a sworn statement from the contractor that material bills had been paid.

The court thus annuls a contrary decision it rendered only a year or so ago, to the effect that it would be unjust to hold a property owner liable on a third party's claim of which he had no notice when he paid the contractor in full. (76 So. 2d 266, 268). The new view adopted by the Florida court is as follows:

"'There is nothing to be gained in condemning or applauding the Mechanics' Lien Law for it is the law of this State. Admittedly it is harsh in many respects, as applied to an owner, and no one improving property can ignore its provisions without coming to grief.

"However, an owner who improves his property can protect himself, at least in part, by demanding that the contractor make the sworn statement provided for in Sec. 84.04(3), F.S.A. before he makes the final payment. An owner is not required to demand such sworn statement before making final payment, but if he does not do so he subjects himself to the possible consequences of having to pay twice for at least a portion of the improvements."

Of course, this decision has no bearing upon the rights electrical subcontractors and suppliers of materials to contractors in other states. But the writer suggests that a subcontractor or supplier should post himself (if he has not already done so) on the question whether, in his state, a lien is waived by failing to give statutory notice, if the owner has failed to take from the general contractor a statement that all claims for materials, etc., have been paid.

New water-tight EMT fittings are installed quickly, easily

Full, true, perfect threads for ease and speed of installation. Bodies of heavy steel —cadmium and zinc finished to eliminate corrosion. UL approved, water-tight EMT connectors and couplings, quality controlled, compression type. In demand for electrical jobs large and small and sized to fit your needs.

Blackhawk Industries takes pride in announcing this new line of compression type EMT fittings. A complete range of sizes is now available. They are a product of Blackhawk research and automated methods of manufacture. Order a stock today to meet the demand for advanced design, quality EMT fittings.

Blackhawk Industries, Dubuque, Iowa

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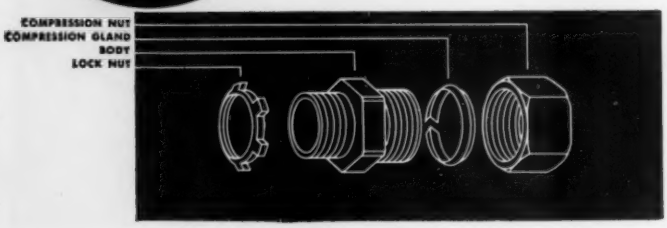

Industry groups

(Continued from page 37)

Metallic Tubing Section of NEMA has produced a sound-color film entitled "Blueprint for Power" which demonstrates the obvious need for realistic long-term planning of electrical wiring installations to meet today's and tomorrom's incerasing use of electricity.

At National Electric we have produced a color-sound film entitled "Octopus in the House," which graphically illustrates the story of how to modernize inadequate wiring. This film was directed toward the individual home owner and has been so successful that we have followed it with a slide presentation we call "Wailing Wires" which is also receiving interest and approval.

There are many more examples throughout the industry of this kind of presentation and I would like to point out that although one association or one company may foot the bill for each presentation the profits revert to everyone throughout the industry.

This is one side of the picture in which the associations of our industry can help pull together, but there is another side which is equally as important and to which we must all give our wholehearted support.

At the beginning of this talk I said that the job of the man in the caboose was to watch it run smoothly down the track and at the same time to guard against any dangers which may lurk in the future. As I believe I have demonstrated, the view down the track looks good. But there are a few danger signals now and then and just so we will know them as they appear I will mention them briefly.

As manufacturers, we are con-

helped to educate the average consumer to the electrical needs of his home. We have also helped him to understand the basic electrical requirements necessary for the protection of his wife and children. In so doing we have also contributed to the economic growth of our industry for wiring in homes that were built fifteen and twenty years ago are no match for the household appliances which are on the market in ever increasing numbers today.

There are other examples of this kind of cooperation which helps everyone and hurts nobody. The Rigid Steel Conduit and Electrical

ecrned about the threat of further direct sales in the industry. I should think that distributors and contractors should be worried, too, since this affects their business just as vitally as it does ours. I have stated my belief on this subject earlier and I mention it now only in passing as a yellow caution light at a crossing farther down the track. You and the trade organizations which work together for your interests must do everything you can to turn that yellow caution light into a green one.

You must also think about the current tendency of some manufacturers to do business through the manufacturer's warehouse or the agent's warehouse in combination with the broker-jobber. This is not the way that we believe the best interests of the manufacturer or anybody else are served. Think about your investment in warehouses, inventory and personnel. This is your business and there is no doubt in my mind that you realize it as well as I do. Something that none of us will ever realize is what the manufacturer who does this kind of business, is thinking of. We know that his operation is a temporary expedient and the child of opportunism. The man who makes this kind of business *his* business is not the man who is worrying about the future growth of the industry. He takes few risks and performs few constructive services. This is not the way to contribute to better business or to the better understanding and development of our industry.

So much for the yellow caution lights down the track. They are few in number as compared to the green ones and in closing I would like to talk with you about them.

I have read somewhere in the papers recently that it is predicted that within the next fifty years, many of our largest cities will double their population. What a green light that is! This means more buildings of every kind in the books. This means more business for the electrical industry but it means also that there will be more growing pains to follow.

I believe that the answer to many of these problems lie simply in one word. That word is *cooperation*. The manufacturer, the distributor, the contractor and the electrical inspector are a four way team in which each must fulfill his specialized assignments, keeping always in mind the assignments of his fellow team mates. Each can help further by supporting the as-

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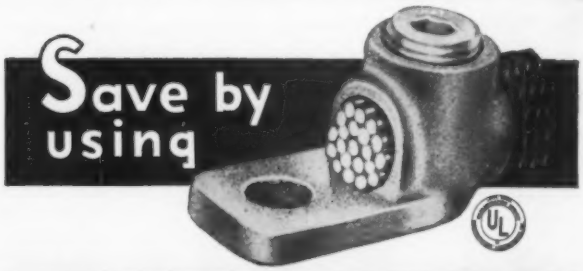

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Combined operation

(Continued from page 67)

No. 1/0. All of these compression connectors are made of aluminum alloy and are filled with inhibitors which help prevent corrosion.

Where it is necessary to use tapes, one type of polyethylene tape, which sets up a drawing or squeezing action after being installed, has proven superior to all others. Also, a small compression hand tool, which was developed recently, has proved very satisfactory, and compression connectors are now being installed with more speed and ease than the old conventional connectors.

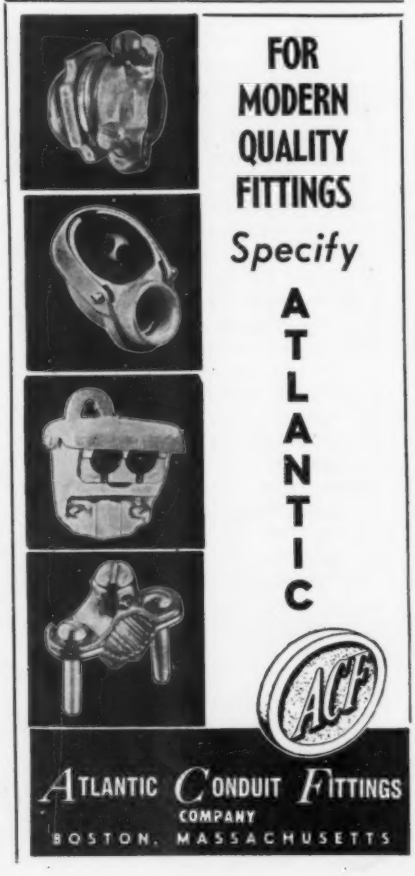
The Testing Section handles all meter testing of the company, shop tests, request tests, installation tests, and periodic field tests of some 215,000 meters.

Meter testing over the years has been one of the essentials that was time-consuming. Previously, it has required a large number of employees a great while to test a few meters, but excellent progress has been made in this field. The long step between the old snap switch disc revolution counting method to the automatic test tables now being used has greatly increased production and immensely improved accuracy. The human error has been removed, efficiency has been increased, and the results have been excellent.

Three automatic test tables are now being used in the test room along with two other older models. However, with the introduction of the modern single-phase, factory-sealed and factory-certified meter, acceptance tests are not as necessary as before; consequently, as many other utility companies are doing, sample tests are being made on only a small percentage of the new meters. A new scientific approach to sample testing single-phase meters in the field is being studied. Other utility companies are making similar studies and one has announced the adoption of this method.

The area method of field testing is now being used, inspecting all meters in the area and testing only the single-phase meters that have not been tested in certain periods of time. Test periods have been increased and will probably be further increased if the current study indicates that the present schedules are more frequent than necessary.

Nothing is done to any meter in the field other than an "as found" test. If the meter is found to need calibration or repairs, it is replaced and returned to the shop for general overhaul or retirement. While at the location, inspection of all other facilities is made, i.e., conditions of the service drops, service anchorage, service clearance and customers' voltages are observed and routine orders are issued to make necessary changes or repairs.



This routine single-phase testing and general inspection is accomplished by a crew of one foreman and four meter testers.

Primary polyphase and single-phase meters with demand attachments are tested more frequently and by individual testers on a due date basis, by areas as far as possible.

Meters are stored in a stock room adjacent to the test room. However, small quantities — which are replenished daily — are stored on the loading docks for replacements on service trucks.

The Standards Laboratory group performs most of the precision work done by the Meter Division. The principal task of this section is the operation of the Standards Laboratory itself. It is in this Laboratory that the standard "watt-hour" is established and maintained. This is accomplished by the use of extremely accurate apparatus including the standard cell, precision potentiometer, standard shunt, volt box, master clock, master indicating voltmeter, ammeter and wattmeter, and master unit rotating standards.

Secondary standards, such as rotating standards used by the field testers, and portable instruments and transformers are periodically checked against the master instruments in the Standards Laboratory.

This section maintains and repairs the various types of demand attachments, whether mechanical, thermal, or recording, that are used in conjunction with the watt-hour meters. In addition, they repair and adjust both mechanical and electronic street lighting controls.

Another important function of this group is the testing of instrument transformers that are required on installations with large loads or high voltages, or both. Insulation, polarity, ratio and phase angle tests are made on current transformers, and insulation, polarity and ratio tests are made on potential transformers. A never-ending variety of acceptance and performance tests on new or doubtful equipment is performed by this group.

A permanent record of portable instruments used throughout the company is maintained in the laboratory for inventory and insurance purposes. A limited amount of maintenance is done on this group of instruments which is made up of such items as indicating and recording ammeters, voltmeters and wattmeters, insulation and ground testers, transformer ratio tests and other portable instruments.

The Clerical Section maintains all the records of the division, which includes meter history, name plate data, location and dates tested, a complete history of meters purchased and retired, monthly inventory records, and daily reports of all work done by the division.

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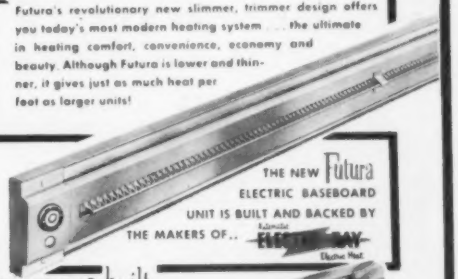

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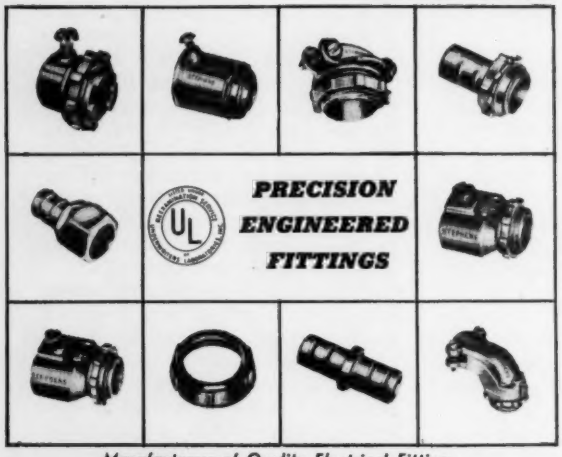

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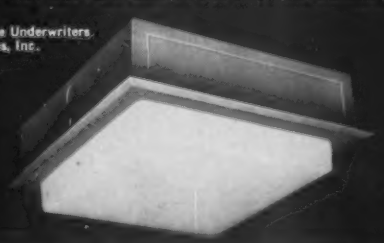

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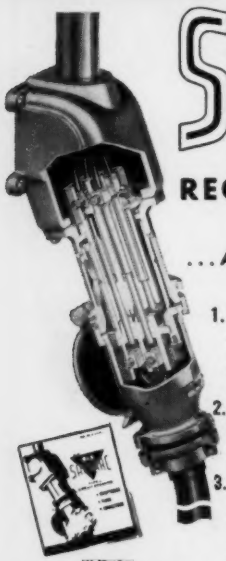

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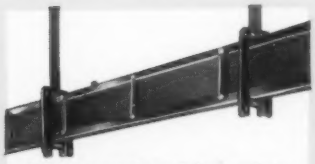

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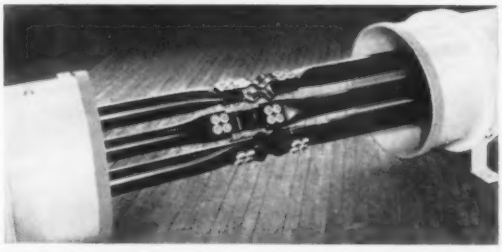
I-T-E adds another first to its achievements in the design and development of bus structures—4.16, 7.2 and 13.8 kv., 1200-3000 ampere nonsegregated phase bus that is completely sealed and air and porcelain insulated. No organic materials are used for insulation. Cork neoprene-gasketed split-half round covers provide a completely sealed bus that can be used indoors or outdoors; bare copper or aluminum conductors are mounted on purified porcelain which has high dielectric strength, is inherently contamination free. The entirely new design has other outstanding advantages, too. The circular design permits installation in much less space. Flexible or laminated connectors make unit sections easier to install.

I-T-E nonsegregated phase bus is ideal for generator leads to transformers, for connecting transformers to switchgear assemblies, for interconnecting switchgear assemblies, and for distribution of light and power in factories and office buildings. For complete information on this new I-T-E product, contact your local I-T-E sales representative. Or write I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.



COMPLETELY SEALED, AIR AND PORCELAIN INSULATED DESIGN eliminates organic insulating materials, permits use indoors and outdoors. Circular construction permits installation in much less space, provides optimum performance—mechanically, thermally and electrically. Laminated connectors provide unusual flexibility, simplify installation. Also compensate for expansion and contraction in service.

I-T-E CIRCUIT BREAKER COMPANY • Switchgear Division

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